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Good Agricultural Practices - Food Safety and Animal Welfare Issues around Egg Powder Exports from India

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Wageningen UR Livestock Research
P.O. Box 65, 8200 AB Lelystad
Telephone +31 320 - 238238
Fax +31 320 - 238050
E-mail info.livestockresearch@wur.nl
Internet <http://www.livestockresearch.wur.nl>

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Abstract

This report describes food safety and animal welfare practices in the Indian poultry value chain that produces egg powder for export to the European Union. Current use of Good Agricultural Practices is assessed and pointers for improvement are provided.

Keywords

Animal welfare, food safety, value chain, egg production, egg powder, GAP, India, India-EU trade

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Author(s)

Jan van der Lee
Nitya S. Ghotge
Gayatri R. Rajurkar
Jitesh K. Panda

Title

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RESEARCH PARTNERS

Vrutti, Livelihoods Resource Centre

#19, 1st Main, 1st Cross, RMV 2nd Stage
Ashwathnagar, Bangalore – 560094, India
Phone No: +91-80-23419616/23517241
Email: Raghu@cms-india.org
Website: www.vrutti.org

Part of Catalyst Group (CMS, Swasti and Vrutti)

ANTHRA Society

Shop F, Lantana Gardens
NDA Road, Bavdhan
Pune 411 021, India
Phone No: +91-020-22953546
Email: anthra.pune@gmail.com
Website: www.anthra.org



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Preface

This research has been a valuable exercise in its own right, bringing together stakeholders from different sectors of Indian society to discuss GAP of the layer industry. Such a result only comes about by the combined effort of many players.

I would like to thank specifically a number of key players for their facilitation efforts: Mr. Hans Wolff and Mr Krishnan Anand of the Netherlands Embassy in New Delhi, Mr. Sharif Mohammed and Mr. Bart Krijns of the Ministry of Agriculture, Nature Conservation and Food Safety in The Hague, and Mrs. Lucy Maarse of Fair Dairy Consult. A large range of people involved in the poultry sector in India and some in The Netherlands have made valuable contributions as stakeholder or resource person. Singling out some of them, how well-deserved it would be, would be unfair to the rest.

Much appreciation is due to my team members from Anthra, Vrutti, LEI, and Livestock Research, particularly to co-authors Nitya, Gayatri and Jitesh. It was a pleasure to work with you.

Jan van der Lee
Lelystad, October 2010

Samenvatting

India is één van de grootste eierenproducenten ter wereld. De lage kosten van productie en de actieve inheemse industrie zorgen voor een concurrentievoordeel. De per capita eierenconsumptie in het land is laag en wordt beïnvloed door seizoensinvloeden. De overtollige eieren worden verwerkt tot eipoeder, een waardevol uitvoerproduct.

De uitvoer van eipoeder wordt beïnvloed door internationale normen en protocollen; het begrijpen hiervan is belangrijk voor de eierenindustrie. Aangezien de Europese Unie een belangrijke importeur van eipoeder van India is, vormen EU-verordeningen en normen een belangrijke benchmark voor Indische exporteurs van eierenproducten. Momenteel concentreren deze richtlijnen zich op voedselveiligheid. Verhoogde aandacht voor dierenwelzijnkwesties in EU-landen zal leiden tot verandering in consumentenvoorkeur. De Good Agricultural Practices (GAP) in de eierenindustrie zullen hier meer en meer rekening mee moeten houden.

India's uitvoer van eipoeder steeg van een povere Rs.0.4 miljoen in 1990 tot meer dan Rs.500 miljoen in 1996, waarna de omvang verminderde. Er wordt verondersteld dat de terugloop werd veroorzaakt door de Sanitaire en Fytosanitaire maatregelen van de EU. Veranderende normen en testmethodes in de verschillende landen maken het voor Indische bedrijven moeilijk aan alle eisen te voldoen. Niettemin is er een potentiële lucratieve markt, op voorwaarde dat de Indische producenten aan essentiële productnormen kunnen voldoen.

Doel en benadering

Het doel van deze studie was om te beoordelen in hoeverre de geëxporteerde Indische eierenproducten voldoen aan internationaal vastgestelde normen voor Good Agricultural Practices (GAP), met inbegrip van voedselveiligheid- en dierenwelzijnaspecten. De studie combineerde interviews met sleutelfiguren, literatuurstudie, en veldbezoeken bij verschillende pluimveebedrijven en eipoederfabrieken. Gebruikmakend van enquêtes werden de huidige praktijken in de sector beoordeeld, evenals de kennis, houding en meningen van diverse belanghebbenden. Halverwege het onderzoek werd een workshop georganiseerd om belanghebbenden uit industrie, onderzoek, technische instellingen, overheid en EU samen te brengen.

Belangrijkste bevindingen

De eipoederindustrie in India

De georganiseerde pluimveesector in India is ongeveer 40 jaar oud. Enkele bedrijven zijn als leiders in de legsector te voorschijn gekomen. Met aanzienlijke steun van de overheid heeft deze bloeiende landbouwindustrie over de afgelopen drie decennia een jaarlijks groeipercentage van 7-8% gerealiseerd. Omdat de consumptie laag en seizoengebonden is, is de verwerking van surplus-eieren tot eipoeder voor de uitvoer een uitgelezen kans voor het bedrijfsleven.

De eierenverwerkende industrie ontstond in de jaren '90, om het uitvoerpotentieel van eierenproducten te benutten. Aanvankelijk werden zes tot zeven fabrieken opgezet in verschillende delen van het land. Momenteel kunnen slechts drie bedrijven voldoen aan de normen van EU en Japan, en kunnen daardoor een vergunning voor de uitvoer naar de EU bemachtigen: SKM (Tamil Nadu), Ovobel (Karnataka) en Venkateshwara (Andra Pradesh).

GAP rond voedselveiligheid en dierwelzijn

De bedrijfsvoering van deze drie bedrijven vertoont veel overeenkomsten qua adoptie van GAP: exporteurs geven de voorkeur aan eieren van geselecteerde pluimveebedrijven. Zij schrijven deze pluimveebedrijven Standard Operating Procedures (SOPs) voor en hun inspecteurs controleren de implementatie hiervan. De productie-inputs voldoen aan minimumkwaliteitsnormen. Veel aandacht wordt gegeven aan bio-security. Laboratoriumfaciliteiten gebruikt men om op aanwezigheid van pesticideresidu's, antibioticasporen en ziektebesmettingen te controleren. De eipoederfabrieken zijn HACCP-compliant.

Over het algemeen is de conclusie dat de bedrijven die eieren voor verwerking tot eipoeder leveren, op een hoger niveau zitten qua voedselveiligheid, dierwelzijn en management dan bedrijven die voor lokale consumptie produceren. De bedrijven die eipoeder voor uitvoer naar de EU produceren, hebben vrijwel allen state-of-the-art faciliteiten, inclusief laboratoria voor het testen van eipoeder, eieren, voer, waterkwaliteit, mest, bloed enz.

De industrie, en vooral de leidende bedrijven, is zich bewust van door de EU gestelde normen en is bereid om zich aan internationale normen aan te passen, mits dat economisch haalbaar is. Verhoogd toezicht en controle op de drie belangrijkste vogelziektes zijn nodig. Overdracht van technologie rond de recentste methodes van ziektecontrole kan nodig zijn.

De pluimveebedrijven gebruiken eenzelfde huisvestingssysteem: batterijkooien met Amerikaanse afmetingen in stallen met gazen wanden waar zo'n 22.000 kippen in passen. De mest wordt verzameld in putten onder de stal en aan akkerbouwers verkocht. Klimaatscontrole is adequaat, met ventilatie, verneveling en verwarming. De kippen hebben vrije toegang tot voer en water van goede kwaliteit. Sommige bedrijven gebruiken lichtregimes van 16 uur/dag. Snavelknippen voert men uit voordat kuikens 12 dagen oud zijn, soms herhaald op 14 weken. Sommige pluimveebedrijven knippen de tenen bij. Gedwongen rui wordt niet toegepast. Veel handelingen voert men handmatig uit, zoals inzameling en sorteren van eieren, verplaatsen van kippen en schoonmaken van de stallen. In veel pluimveebedrijven wordt de voorkeur gegeven aan vrouwelijke werknemers, omdat zij de kippen voorzichtiger behandelen en de voorschriften beter volgen. Door de hoge investeringen handhaven de meeste bedrijven optimale productieomstandigheden. Het verlagen van deze normen zou resulteren in lagere productie met minder winst als gevolg.

De eieren die worden geweigerd voor verwerking tot eipoeder gaan naar de Indische markt, waar consumenten minder kritisch zijn wat betreft residuen en ziekterisico's. De gemiddelde Indische consument is zich niet bewust van de gebruikte productieomstandigheden en is niet bereid om meer te betalen voor eieren van pluimveebedrijven met hogere voedselveiligheidsnormen. Alleen Kegg Farm beweert een hogere prijs te kunnen krijgen voor kooivrije eieren zonder antibiotica, hormonen of chemische middelen.

Uitgeselecteerde leghennen worden verkocht voor slacht in de open markt. Transportomstandigheden variëren sterk. De slachtmethode is gewoonlijk *halal*, aangezien vele delen van India om *halal* vlees vragen en de meeste slagers tot de moslimgemeenschap behoren. Zieke kippen worden behandeld buiten hun kooi en dode kippen worden begraven en gecomposteerd.

Momenteel gaan de GAP-normen hoofdzakelijk over voedselveiligheid in de invoerende landen. Hoewel dierwelzijn geen belangrijk onderwerp is in de eipoederhandel, zijn de exporteurs zich er goed van bewust door contact met hun Europese klanten. Ze willen weten wat ze kunnen verwachten qua extra eisen, zodat ze hun productieproces kunnen aanpassen. Over het algemeen werd geconstateerd dat de bedrijven die eieren leveren voor verwerking tot eipoeder hoger scoren wat betreft voedselveiligheid, dierwelzijn en management, dan bedrijven die voor de lokale markt produceren. Als het dierwelzijn vanuit het perspectief van 'Vijf vrijheden' wordt geëvalueerd, zien we dat de bedrijven hoog scoren qua vrijheid van honger en dorst en vrijheid van pijn, verwonding of ziekte, matig qua vrijheid van angst en stress, en laag qua vrijheid van ongemak en vrijheid om normaal gedrag te vertonen.

Kwaliteitscontrole

Bij het verzekeren van de productkwaliteit in de keten, komen de volgende kwesties naar voren:

Pesticidenresiduen - een belangrijke zorg is de aanwezigheid van pesticidenresiduen, die sporen in de eieren kunnen achterlaten. Het "Groene revolutie" beleid in India en de subsidies voor kunstmest en pesticiden werkt vaak tegen het doel van pesticidenvrij voedsel in. Aangezien zelfs de kleinste hoeveelheid pesticidenresiduen in weigering van de volledige zending van eipoeder kan resulteren, is de sector er scherp op pesticidenvrije grondstoffen te gebruiken voor het kippenvoer. De meeste pluimveebedrijven die aan eipoederfabrieken leveren, halen hun voer uit gebieden waarvan bekend is dat ze aanvaardbare niveaus van pesticidenresiduen hebben.

GMOs – het EU standpunt voor Genetisch Gemodificeerde Organismen (GMOs) blijft verwarrend voor buitenstaanders. Terwijl de EU het kweken van GM gewassen in haar lidstaten niet toelaat, is er geen verbod op het invoeren van eipoeder uit landen waar het pluimvee op GM maïs of soya wordt gevoed. Er is een vrij sterke anti-GMO lobby in India. Dit biedt kansen voor gemeenschappelijke standpunten.

Antibioticaresiduen - Pluimveebedrijven die voor de eipoederfabrieken produceren vormen een positieve uitzondering op algemene praktijk. De antibiotische residu's zijn een factor van belang in India omdat het tropische milieu in hoge ziekterisico's resulteert. De meeste pluimveebedrijven geven anticoccidials, anti-mycoplasmamedicijnen en groeipromotors tot op 8 weken leeftijd van de kippen. Tot nu toe is in India geen wettelijke bepaling over de onttrekking van antibiotica; daarom blijven veel antibiotica in gebruik en worden de eieren verkocht zonder te wachten op de onttrekkingperiode.

Er zijn al initiatieven in de industrie om goedgekeurde probiotics en kruiden- en *ayurvedische* geneesmiddelen te gaan gebruiken.

Regelgeving en naleving

De Export Inspection Council (EIC) en zijn regionale Agentschappen certificeren bedrijven voor eipoeder voor export. Een behoorlijk aantal verschillende ministeries en afdelingen hebben wettelijke bepalingen op het gebied van voedselveiligheid uitgevaardigd die de productie en de uitvoer van eipoeder beïnvloeden. Dit maakt het moeilijk voor individuele actoren om de hele regelgeving te begrijpen. Verder leiden internationale verordeningen (zoals CAC), en de specificaties van het importerende land of de klant tot een ingewikkeld beeld.

De SOPs van de exporteurs beantwoorden aan de normen van de EU voor ingevoerde goederen, zodat de bedrijven productie kunnen verzekeren van eipoeder van hoge kwaliteit wat aan de specificaties van klanten en autoriteiten voldoet. De regelmatige inspectie van de betreffende bedrijven zorgt ervoor dat de pluimveehouders zich aan deze normen houden.

KAP - Meninge n over voedselveiligheid en dierwelzijn

De *Knowledge, Attitudes and Perceptions* (KAP) over GAP in de eipoederketen variëren aanzienlijk, afhankelijk van het profiel van de betreffende persoon.

Industrie: Er is een algemene bereidheid onder de exporteurs en bijbehorende pluimveebedrijven om (internationale) normen te accepteren. De belangrijkste zorg betreft de schommelende en soms algemene aard van deze richtlijnen. Spelers in de eipoeder-exportketens moeten de kosten verbonden aan de invoering van GAP kunnen relateren aan de extra marges. Aangezien testfaciliteiten vrij duur zijn, vraagt men investeringssteun door de Indische overheid. Op internationaal niveau is behoefte aan standaardisering van GAP voor de diverse marktsegmenten, omdat GAP-richtlijnen variëren al naar gelang de koopkracht van het invoerende land.

Topmanagers van betrokken bedrijven zijn zich bewust van de *best practices* en de internationale normen, maar voelen dat ze worden beperkt door de geringe beschikbaarheid van land. Om de maïsprijzen laag te houden, willen de bedrijven graag goede geïrrigeerde landbouwgrond voor maïsverbouw gebruikt zien. Groepen die zich meer op algemene voedselveiligheid richten, verzetten zich hiertegen. De industrie lobbyt voor verandering.

Het bewustzijn van de noodzaak van bio-security is goed ontwikkeld in de eipoederketen actoren. On-farm bio-security wordt gewoonlijk goed volgens SOPs gehandhaafd. De pluimveebedrijven die voor de eipoederfabrieken produceren zijn gedwongen om hun locatie zorgvuldig te kiezen, om besmetting vanuit naburige pluimveebedrijven te voorkomen.

Pluimveehouders: De grote pluimveebedrijven proberen de aanbevelingen van leidende bedrijven en universiteiten te volgen om de uitvoer van hun product te bewerkstelligen. Zij zijn zich bewust van dierenwelzijnnormen en velen zijn bereid om omstandigheden te verbeteren als de markt dat eist. Het ophouden van hoge bio-security en dierenwelzijnnormen is duur. Over het algemeen zijn kleine en middelgrote pluimveebedrijven en slagers niet goed ingelicht over voedselveiligheid en dierenwelzijnsaspecten, vooral wanneer het over internationale verordeningen gaat.

Regering van India: De belangrijke centrale instanties zoals APEDA, EIC, en MoFPI zijn zich natuurlijk goed bewust van kwesties met betrekking tot dierwelzijn, voedselveiligheid en handel. De overheid is er sterk tegen gekant welzijnskwesties in handelsbesprekingen te agenderen.

Indische consumenten: De gemiddelde Indische consument is zich niet bewust van de productiemethodes die in de pluimveesector worden gebruikt. Dit resulteert in een verschil in KAP tussen de industrie en het algemeen publiek. Druk op de sector is tot dusver alleen gekomen van de weigering van exportzendingen of van activistische dierenwelzijnsgroepen in het land.

Aanbevelingen

Een aantal aanbevelingen werden al geformuleerd tijdens de stakeholder workshop die werd gehouden om GAP en groeipaden te bespreken. De besprekingen in deze workshop toonden kansen op toekomstige betrokkenheid bij voedselveiligheid en dierenwelzijnkwesties. Aanbevelingen gebaseerd op dit onderzoek omhelsen:

Rondom het gebruik van antibiotica - het beleid rond gebruik van antibiotica en onttrekkingperiodes vergt verbetering en handhaving. Meer onderzoek is nodig naar het gebruik van ethno-veterinaire drugs, pro-biotics en *Ayurvedische* geneesmiddelen in de commerciële pluimveesector, evenals verhoogd toezicht en testen, vooral voor ziekten als HPAI en salmonella.

Rondom pesticidenresiduen - stringenter actie is nodig rondom het gebruik van pesticiden; een welomlijnd programma is nodig om het gebruik van pesticiden te verminderen en verkoop van pesticiden en ontmoedigen.

Rondom dierwelzijn – de commerciële relatie tussen Westerse kopers en Indische leveranciers van eipoeder schijnt de beste manier te zijn om dierenwelzijn te verbeteren in de eipoedersector en verdere sectoren. De pluimveesector is bereid om hogere dierenwelzijnnormen goed te keuren zolang landbouwers en fabrikanten een redelijke prijs ontvangen. Implementatiekwesities omvatten het betrekken van kleinere bedrijven voor lokale productie, beleidsontwikkeling rond minimumnormen, controle op de naleving van normen, dierwelzijngelinkte etikettering en marktontwikkeling, en aanmoediging van productiesystemen met goed dierwelzijn.

Terwijl marktmechanismen goed kunnen werken voor verbetering van dierwelzijn in exportgerichte veehouderij (zoals eipoeder), zou de verbetering van dierwelzijn in India op grotere schaal politieke steun vereisen om een breder scala aan activiteiten uit te voeren. Begonnen kan worden met voorlichtingscampagnes onder stedelijke eliteconsumenten op zowel voedselveiligheid als dierenwelzijngedebiet, en opname van dierenwelzijn en voedselveiligheidsonderwerpen in de opleiding van veterinaire studenten. Een effectieve breder aanpak van dierwelzijn vereist samenwerking met veterinaire gezondheidsdiensten.

Een aantal aanbevelingen voor specifieke spelers zijn opgenomen in paragraaf 6.2.: voor de Industrie, Pluimveehouders, de Europese Unie, de Indische Overheid, Veterinaire Universiteiten & Onderzoeksinstituten, de AWBI, Indische NGOs en Dierwelzijnsorganisaties.

Summary

India is amongst the largest egg producers in the world. It enjoys a competitive advantage due to the low cost of production and its vibrant indigenous industry. Per capita consumption of eggs in the country is low and is affected by seasonal patterns. Surplus eggs converted to egg powder are a valuable export product.

Exports from India are affected by international standards and protocols; understanding these will help the layer industry. As the EU is a significant importer of egg powder from India, EU regulations and standards form a significant benchmark for Indian exporters of egg products. Currently these guidelines focus on food safety issues. An increased emphasis on animal welfare issues can be expected as a result of changing consumer demand in EU countries. Good Agricultural Practices for the layer industry increasingly should take this into account.

Egg powder exports increased from a meagre Rs.0.4 million in 1990 to more than Rs.500 million in 1996. Since then exports have decreased. Sanitary and Phytosanitary measures imposed by the European Union (EU) are believed to be responsible for this. The varying requirements, standards and methods of testing of different countries make compliance difficult for Indian companies. Nonetheless, there is a potential lucrative market, provided the Indian producer can match certain essential product standards.

Purpose and approach

This study was intended to assess how Indian egg export products comply with internationally accepted standards for Good Agricultural Practices, including food safety and animal welfare aspects. It combined desk study, interviews with key resource persons, and field visits to different poultry farms and egg powder producing units. Using questionnaires, current practices as well as knowledge, attitude, and perceptions of different stakeholders in the sector were assessed. A workshop was organised half way through the project to bring together different stakeholders from the industry, research and technical institutions, the government and the EU.

Major findings

The egg powder industry in India

The organised poultry sector in India is approximately 40 years old; a few companies have emerged as leaders. With considerable support from the government, this thriving agri-business in layers has registered an annual compounded growth rate of 7%-8% for the past three decades. Since consumption is low and seasonal, conversion of surplus eggs to egg powder for export is an appropriate business opportunity.

The egg processing industry came into existence in the 1990s, to take advantage of the export potential of egg products. Initially, six or seven plants were set up in different parts of the country. At present only three companies make the grade for meeting international standards applied by EU and Japan and are licensed for export to the EU: SKM (Tamil Nadu),; Ovobel (Karnataka), and Venkateshwara (Andhra Pradesh).

Good Agricultural Practices around food safety and animal welfare

There is much similarity across the three licensed egg powder manufacturing and exporting units with regards to the organization of the egg powder value chain and with regards to the adoption of Good Agriculture Practices (GAP): Export Units prefer to purchase eggs from exclusive poultry farms. They prescribe these farms standard operating procedures (SOPs) with respect to poultry housing, care and management, implementation of which is monitored through farm supervisors appointed by the Export Unit. Production inputs meet minimum quality standards. Much attention is given to bio-security. Laboratory facilities are used to monitor absence of pesticide residues in feeds, antibiotics traces and disease infections in eggs. Egg powder units are HACCP compliant.

In general, it was observed that farms supplying eggs for conversion to egg powder maintain higher standards of food safety, animal welfare and management than farms producing eggs for local consumption. Companies producing egg powder for export to the EU almost uniformly have state-of-the-art facilities, including laboratories for testing egg powder, eggs, feed, water quality, bird faeces, blood, etc.

The top companies are aware of the standards set by the EU and are willing to adapt to international standards, provided it is economically viable. Increased surveillance and monitoring to control the three major poultry diseases are needed. Technology transfer in the latest disease control methods may be appropriate.

Farms use a uniform housing system: USA-size multilevel cages in elevated wire-mesh-walled barns housing around 22,000 birds. Manure is collected in pits under the barn and sold to crop farmers. Climate control is adequate, through ventilation, fogging and heating. Birds have free access to feed and water of good quality. Some farms create photo-periods of up to 16 hours. Beak trimming is practiced before the chicks are 12 days old, sometimes repeated at 14 weeks. Some farms practice de-toeing. Forced moulting is not applied. A number of operations, such as collection of eggs, movement of birds, cleaning of sheds, sorting the eggs, etc, are done manually. Women are preferred in many farms as they are supposed to be gentler while handling birds as well as more conscientious about maintaining standards. As the investments are high, most of the units maintain optimum standards for production. Lowering these standards would result in lower production with connected loss of profit for the poultry farmer.

Eggs rejected for conversion to egg powder enter the Indian market, where consumers are not critical about quality issues like residues and disease risks. The average Indian consumer is not aware of either production methods or farming methods employed and is not willing to pay a premium for eggs from farms with higher food safety standards. Only Kegg's farm claims a premium price for "cage free eggs" which contains no antibiotics, hormones, or chemical stimulants.

Culled and old birds are sold in the open market for slaughter. Transportation methods vary wildly. As many parts of India require halal meat and most butchers belong to the Muslim community, the method of slaughter is usually halal. Diseased birds are treated outside their cage and birds that die are buried and composted.

Currently, GAP standards primarily relate to adherence to food safety standards of importing countries. Although animal welfare has not been a major concern in egg powder export trade, export units are quite aware of it through discussion with their EU customers. They are interested to know what exactly they can expect in terms of additional requirements, as to adjust their production processes.

In general, it was observed that farms supplying eggs for conversion to egg powder maintained higher standards of food safety, animal welfare, and management than farms producing eggs for local consumption. From a five freedoms perspective, animal welfare can be evaluated as scoring high on freedom from hunger and thirst and freedom from pain, injury or disease, medium at freedom from fear and distress, and low at freedom from discomfort and freedom to express normal behaviour.

Issues in quality control

In assuring product quality in the value chain, stakeholders face the following issues:

- **Pesticide residues** - A major concern has been the presence of pesticide residues in feeds that leave traces in eggs. The country's green revolution policy and subsidies for fertilisers and pesticides often work against the target of achieving pesticide-free food. As even a very small amount of pesticide residue in eggs can result in rejection of an entire consignment of egg powder, the sector is keen to access pesticide free feed ingredients. Most farms linked to egg powder units procure feed from specific areas which are known to have acceptable pesticide residue levels.
- **GMOs** - The EU's stand on Genetically Modified Organisms remains confusing to outsiders. While the EU does not allow growing of GM crops in its member countries, no ban exists on import of egg powder from countries where poultry are fed on GM maize. A fairly strong anti-GMO lobby exists in India. This offers opportunities for joint positions.
- **Antibiotic residues** - The farms producing for egg powder units form a positive exception on general practice. Antibiotic residues are a factor of concern in India as the tropical environment results in high disease risks. Most farms give anti-coccidials, anti-mycoplasmal drugs and growth promoters up to eight weeks of age of birds. As yet, there is no legal provision in India regarding the withdrawal of antibiotics; hence, many antibiotics continue to be in use and eggs are sold without waiting for the stipulated withdrawal period. There already is a move by the industry to adopt accepted pro-biotics as well as validated herbal and ayurvedic medicines.

Regulatory framework and compliance

The Export Inspection Council (EIC) and its regional Export Inspection Agencies certify companies for a.o. egg powder for export. A significant number of different ministries and departments have issued legal provisions on food safety that affect egg powder manufacturing and export. This makes it hard for single actors to understand the whole scene. Moreover, international regulations (such as CAC), and special requirements of the nation or customer to which is exported create a complicated scene.

The SOPs of the egg powder units are up to EU standards for imported goods, so companies can ensure production of dependable and quality egg powder that meets the requirements of customers and authorities. Regular supervision of farms supplying eggs ensures that the farmers maintain these standards.

KAP - Views on food safety and animal welfare

Knowledge, Attitudes and Perceptions (KAP) on Good Agricultural Practices in the egg powder chain vary considerably, depending on the profile of the person.

- *Industry:* There is an overall willingness amongst export units and associated poultry farms to adhere to international standards and norms. The major concern is about the rather fluctuating and at times generic nature of these guidelines. Players in the egg powder export value chain need to be able to relate costs incurred in adopting the GAP to additional margins obtained. As some of the testing facilities are quite expensive, there also is a call for investment support by the Indian Government. At international level, there is a need for standardization of GAP linked to different market segments, as guidelines for GAP vary according to the purchasing power of the importing country.

Top management of involved companies is aware of the best practices and international standards, but feels constrained by country conditions. For example, as the agricultural policy of India does not ban pesticides, it is difficult to obtain pesticide-free maize. To keep maize prices down, companies favour the use of prime irrigated agricultural land for maize cultivation. Groups more concerned about food security oppose this. The industry is lobbying for change on such issue.

Awareness on the need for bio-security is well developed among egg powder value chain actors. On-farm bio-security is usually well-maintained according to SOPs. Farms producing for egg powder plants are forced to choose their locations carefully, not to be subject to contamination from neighbouring farms through air-borne infections.

- *Farmers:* Large poultry farmers try to follow the recommendations of top companies and the universities to enable export of their product. They are aware of animal welfare standards and many are willing to improve standards as dictated by the market. However, ensuring high bio-security and animal welfare standards is expensive. In the poultry scene at large, small and medium-sized poultry farmers and butchers are not well informed about food safety and animal welfare aspects, especially when it comes to international regulations.

- *Government of India:* Key central government departments like APEDA, EIC, and MoFPI are naturally well aware of the issues related to animal welfare, food safety and trade. The government has been loath to include welfare issues in trade talks.

- *Indian consumers:* The average Indian consumer is not aware of either production methods or farming methods employed in the poultry sector. This results in a divergence between industry KAP and general public KAP. Pressure has so far come either because exports have been rejected or from animal welfare activist groups within the country.

Recommendations

Some of the recommendations included were formulated during the stakeholder workshop that came together to discuss Good Agricultural Practices and ways forward. The discussions at this workshop showed a window of opportunity for future involvement on food safety and animal welfare issues.

Recommendations based on this research include:

On the use of antibiotics - Policies on use of antibiotics and withdrawal periods need improvement and enforcement. More research is required on the use of ethno-veterinary drugs, pro-biotics and Ayurvedic medicines in the commercial poultry sector, as well as increased surveillance and testing, especially for diseases like HPAI and salmonella infection.

On pesticide residues - More stringent action on the use of pesticides and a definite programme to withdraw pesticides as well as disincentives to companies selling pesticides in the country has to be followed.

On animal welfare - The commercial relationship between Western buyers and Indian suppliers of egg powder seems the best avenue to improve welfare in the egg powder sector and beyond. The poultry sector is willing to adopt higher animal welfare standards as long as farmers and processors receive a commensurate price. Issues around implementation include inclusion of smaller units for local production, policy development around minimum standards and monitoring compliance to those

standards, animal welfare-linked labelling and market development, and incentives for animal welfare-linked production systems.

While market mechanisms for improvement of animal welfare could well work for export oriented livestock production like egg powder, improvement in animal welfare in India at a larger scale would require political support to implement a wider set of interventions. Starts could be made with awareness raising campaigns amongst urban elite consumers on both food safety and animal welfare issues, the training of veterinary students to include sufficient training in animal welfare and food safety subjects. Effectively addressing livestock welfare in general requires collaboration with veterinary health services activities.

A number of recommendations for specific actors are included in paragraph 6.2. – for the Industry, Farmers, the European Union, the Indian Government, Veterinary Universities & Research Institutions, the AWBI, Indian NGOs and Animal Welfare Groups.

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1 Introduction

1.1 The Context

India has a large egg production sector and today is the third largest producer of eggs globally. Table eggs are primarily produced for the local market, while exports are dominated by non-perishable egg products like egg powder. The sector enjoys a competitive edge due to relatively low grain/feed prices in India. However, costs of disease prevention & control as well as risks of rejection of substandard products in the international market have made it imperative for the sector to assess its husbandry and healthcare practices, to ensure long-term competitiveness. The Dutch Ministry of Agriculture, Nature and Food Safety (LNV) was interested in assessing the quality aspects of Indian egg products, from the perspective of the total value chain. It wanted to understand the systems that are in place to ensure that Indian egg products are free of harmful contaminants and are produced in technically and socially acceptable ways (using Good Agricultural Practices, GAP). Understanding the current status of product quality control mechanisms and the efforts made to further ascertain safe and acceptable production practices may enhance the acceptability of the Indian poultry products, as well as those of the wider livestock sector.

As India's competitiveness in global market depends on a good international reputation with respect to food-safety and non-trade concerns, it is expected that the results of this research could be used by the Indian poultry sector to augment the credibility of its quality control systems. It may also facilitate informed bilateral or multilateral negotiations between India and European Union (EU) trade partners.

1.2 Project Goals, Expected Outcomes and Activities

The Indian egg powder industry was selected as case study by the Ministry and Wageningen UR, due to its strong linkages with India-EU trade and the developments in EU regulations regarding Animal Welfare. This industry was assessed from a whole value chain perspective - from input supply to production to processing to trade with customers in the EU.

As the concept of animal welfare is relatively unknown and contentious in India, animal welfare was presented under the umbrella of Good Agricultural Practices (GAP). This allowed a broader approach of trade- and non-trade concerns and links with the better known and more accepted requirements on food safety issues.

General Goal

To identify how Indian egg products comply with internationally accepted standards for GAP, including food safety and animal welfare aspects.

Research Objectives

To investigate current husbandry and healthcare practices in various systems for egg powder production - to assess the strong and weak points of egg production and marketing practices (facilities & techniques, packaging, storing and transportation) and practices along the life cycle of hens (hatchery, rearing, transportation, production husbandry, transportation, slaughter).

To investigate perceptions, attitudes, awareness of actors across the entire chain on food safety and animal welfare aspects, as well as deviations from attitudes of the general public.

To identify opportunities and strategies to improve agricultural practices (where necessary), using awareness raising, certification, and communication activities.

Expected Results

Insight into social, economic, cultural, political context for promotion of food safety and welfare issues around egg production in India, expressed in a report, with particular emphasis on:

- policies regulating animal production – effects on food safety and animal welfare; match / gaps with the EU standards;
- the set up of value chains for egg powder and strengths & weaknesses in terms of food safety and welfare in each step of the chain;
- overview of actors involved in (promotion of) GAP on food safety and animal welfare (producers and – organisations, consumers and – organisations, traders, retailers, policy-makers, NGOs); quality assurance mechanisms; views of Indian actors on food safety and animal welfare; differences with other countries studied in this project;

- opportunities and constraints in promotion of food safety and animal welfare in India; feasibility of technical solutions within Indian context;
- a plan of action on promotion of GAP for egg production in India, resulting from a workshop with selected stakeholders and agreed with LNV.

1.3 Research Team

The research was carried out on request of the Dutch Ministry of Agriculture, Nature Conservation and Food Quality by a partnership of three organizations (see table 1): Wageningen UR Livestock Research, Anthra Foundation and Vrutti (part of Catalyst Management Group). Following a tender & negotiation process, the research partners formed a team with expertise in the fields required, which included: poultry production, animal welfare, value chain analysis, , agricultural commodity processing & marketing, group facilitation, liaison, research planning & management, interviewing of various stakeholders, primary & secondary data analysis, and reporting. Anthra, as the lead agency in India, organised the research and supervised the team of consultants. The team included the following members:

Table 1 Research and Study Team members

Ir. Jan van der Lee	Research Manager	Masters in Tropical Animal Husbandry, Researcher at Wageningen UR Livestock Research
Dr Nitya Ghotge	Research Coordinator	Masters in Veterinary Science (Surgery), Founder Director ANTHRA
N Raghunathan	Advisor	Masters in Rural Management, with Bachelor in Agricultural Engineering; Co-Founder and Director of Vrutti and Catalyst Group
Dr Gayatri R. Rajurkar	Primary Researcher	Masters in Veterinary Science (Veterinary Microbiology) working with ANTHRA since 2003.
Jitesh K. Panda	Primary Researcher	Masters in Rural Management; working with Vrutti as Senior Consultant
Manuel GH	Secondary Researcher	Vrutti Coordinator (Madurai, Tamil Nadu), BE Agri Engineering, MBA; over 10 years experience in livelihood promotion.
Balakrishnan S	Secondary Researcher	A graduate in Science and Pursuing MBA, working as a Senior Consultant in Vrutti, over nine years experience in facilitating micro-finance and livelihoods

1.4 Assessment Approach

This study combined desk-research with field surveys in key geographic locations among chain actors and key informants. The research used a combination of qualitative and quantitative methods (including value chain analysis, questionnaires, monitoring protocols and semi-structured interviews). The research concentrated on the poultry belts in the states of Tamil Nadu, Andhra Pradesh and Karnataka.

1.4.1 Initial approach

The intention was to conduct nested sampling to cover an acceptable number and types of farms as well as other stakeholders. The findings of the various research components were to be presented and validated in a workshop of selected stakeholders in India, followed by definition of a plan of action that would be discussed with the Netherlands Agricultural Office in New Delhi and LNV The Hague.

The various stages initially envisaged in the project were:

1. **Preparatory Stage:** Undertake a quick scan of the sector; identification of the groups involved in egg production, export of egg products, and/or animal welfare; exploration of potential collaborations; identification of key stakeholders and resource persons, research locations, and decisions on sampling methods and tools for the survey.
2. **Sector Analysis,** including
 - inventory of the state of egg production and trade (husbandry systems, chains, actors and their relationships and volumes);
 - inventory of the legal framework regarding egg production and trade, with particular focus on (potential) food safety and animal welfare regulations;

- inventory of local food safety and animal welfare status in various systems (*using checklist based on Welfare Quality Protocol*); comparison of current practices with the EU regulations (for laying cycle) and best practices in the Netherlands (for stages not covered by the EU regulations);
 - KAP study into *Knowledge, Attitudes and Practices* regarding food safety and welfare of layers / poultry in general.
3. **Preliminary analysis of data for presentation to workshop**
 4. Draft report preparation.
 5. Preparation for, and holding, a **workshop** to identify realistic strategies for promotion of GAP for layer hens, with selected stakeholders; determining potential further actions and actors. It was also decided to discuss follow up work plan with LNV-Delhi and LNV-The Hague,
 6. Finalisation of the **report**

In the initial stage, a questionnaire was prepared adapted from the layer hen monitoring protocol provided by Wageningen UR. The farm monitoring protocol was modified to suit Indian conditions (appendix 7). It was pre-tested at two layer poultry farms: one near Bengaluru (Karnataka) and another at Pune (Maharashtra). On the basis of the findings of pre-testing on these two farms, the protocol was revised and necessary inclusions were made. This questionnaire was used to collect data from the farms visited.

1.4.2 *Need for change in approach: mid-term review findings*

A mid-term review meeting in New Delhi in December 2009 enabled the team to gauge the project's progress. It was evident that the industry was not keen on allowing the research team to visit their farms. This made it difficult to conduct the layer hen monitoring protocol and the KAP questionnaire. It was decided to change the approach and organise the workshop first, to generate interest in the subject and then chase up/schedule the field visits. The workshop would also help to reach smaller units being set up which do not export to the EU currently but sell to other countries. These units are interested in learning about good practices. The workshop would also be an effective way to invite representatives from the poultry industry, government departments, veterinary universities, and NGOs to one platform. As getting access to farms supplying eggs to functioning egg powder units was not easy, it was decided during the midterm review to contact a wider group of people to contribute to the study, including farms which had once supplied to these three companies but were no longer a part of the chain. Problems in filling the layer hen monitoring protocol were also discussed. Despite modifications, the monitoring protocol could not be filled easily in the present form and needed to include more descriptive data on Good Agricultural Practices (GAP).

1.4.3 *Workshop*

A workshop on "Good Agricultural Practices in the Indian Layer Industry; Opportunities and Challenges for Egg Powder Export" was organised on 20th – 21st January 2010 at Hotel Sun & Sand, Bund Garden Road, Pune (Maharashtra). The workshop was well received; 35 people attended. It provided an excellent platform for poultry farmers, egg powder manufacturing and exporting industries, professors from veterinary colleges, the Export Inspection Agency, research institutes on trade issues, and animal welfare groups, such as CUPA (Compassion Unlimited Plus Action) and AWBI (Animal Welfare Board of India), to participate, deliberate and share their views across the three themes on which the deliberations were focused, namely, food safety, animal welfare and egg powder trade. The participants also came up with ideas and recommendations which are attached in appendix 2 (from workshop proceedings (Ghotge and Rajurkar, 2010)). The disadvantage of this change in approach was that no definite action plan for follow up activities could be discussed during the workshop.

1.4.4 Interviews & visits to resource persons

While compiling information on the sector, it was found that the number of actors manufacturing and exporting egg powder from the country was very small (only three companies). This extremely small number of manufacturers forced the decision to hold the workshop initially to harness interest in the subject and to kick-start the process of discussions.

It was decided to contact egg powder exporters in India in two ways - formally, by contacting them through the corporate offices; and informally, through ex-employees, veterinarians or farms in contract/contact with the company. It was also decided that researchers and scientists in the poultry sector in India would be contacted, as well as veterinarians working in different institutes related to the poultry sector. Through internet search, interviewing of key resource persons, and review of literature, key informants were identified and selected on the basis of their expertise in the poultry sector. They were selected from the following groups and communities:

- Poultry industry and egg powder manufacturing units
- Poultry farms and farmers
- Veterinary colleges and universities
- Research institutes
- Government organisations
- European Union.

The poultry industry

People from several companies in the poultry sector were contacted. These included people at different levels: managerial personnel, veterinarians and staff working in various sections, like poultry feed & nutrition, medicines, chick sales, and vaccine division, to gauge the current level of understanding of animal welfare and food safety at various levels of the companies' hierarchy. The following poultry industries were contacted: Venkateshwara, Suguna, Skylark Hatcheries, Phoenix, Japfa, AG Foods, Indian Ovo, Kegg Farms, SKM and Ovobel.

The research team also contacted the Indian Poultry Producers' Association, the Poultry Federation of India, and the National Egg Coordination Committee. Representatives of pharmaceutical companies that are active in the poultry industry, such as Intervet, were also contacted. Freelance consultants with an interest in poultry production were contacted about the standards they recommend to poultry farmers. Where possible, production units were visited. The response from the poultry sector was mixed. Most were hesitant to allow the research team to visit their farms. While some companies shared their Standard Operating Procedures (SOPs) and permitted the research team to visit the unit, many were not communicative and even declined to give appointments.

Egg powder manufacturing units

A list of egg powder manufacturing and exporting units downloaded from the Internet was prepared in a preliminary search on the sector. Out of the 17 exporters listed (see appendix 1), only three companies had licenses for export to Japan, EU and USA as issued by the Export Inspection Council of India (see par 3.1.3.2). The others are primarily traders in the local egg market; some also export to Gulf countries. Attempts were made to contact these various companies, but none of them was currently manufacturing egg powder and they were not forthcoming with any information. It was, therefore, decided to pursue the study only with the three units presently exporting to the EU. An EU based sales representative of SKM was interviewed in the Netherlands.

While the intention was to visit at least one egg powder exporter each in Haryana, Maharashtra and Tamil Nadu, the documents of Export Inspection Council revealed that there are only three companies in India which have been given permission to export egg powder. All three companies are located in South India; none in Central or North India. Hence the study was confined to South India.

Poultry farmers

Both large and small poultry farmers were contacted in different states. Initially, they were contacted to pre-test the monitoring tools. They were also contacted to get an insight into the present state of food safety and animal welfare standards followed at their farms.

It was difficult to get entry into farms that supply to egg powder manufacturing and exporting units, as the company with which they have a contract as a policy do not allow strangers on the farm for bio-security reasons. Except Ovobel Foods Ltd in Bengaluru, (Karnataka), the industry was not open to farm visits or to share information about the farms which supply eggs to them. They supplied their standard protocols,

but did not allow the team to visit their farms to verify whether the farms did, indeed, observe the protocols.

Initially, there was a plan to visit several layer farms supplying eggs to egg powder manufacturing units; however, due to the constraints mentioned above, this was not possible. Most poultry farms in the country are reluctant to entertain research teams as they feel these are inspection teams. The egg powder manufacturing units exporting to the EU initially were not forthcoming about allowing the research team to visit their farms. Following the workshop, companies were more open to the idea and it was possible to conduct a limited number of visits. In the end, the team visited one farm and interviewed the owner of another farm, both supplying eggs to the SKM industries egg powder unit in Tamil Nadu, and visited two farms supplying to the Ovobel unit in Karnataka (see table 2). No visit could be made to farms supplying to the Venkateshwara Hatcheries unit in Hyderabad, Andhra Pradesh.

The layer hen monitoring protocol (see appendix 7) could be documented properly for only the five farms that were visited. Of these only three supplied to egg powder units. It was filled in indirectly for one farm of which the owner was interviewed but an actual farm visit was not made.

The KAP questionnaire could not be filled in for farm workers, because the research team was not allowed to interact with them. Moreover, since the labourers employed were not literate, to obtain correct answers in the limited time provided for the farm visits would have been well-nigh impossible.

Companies were comfortable with the idea of the research team interacting with staff.

At various stages during the study, farms not supplying to egg powder plants were visited for purposes of format development and comparison (see table 3).

As the number of farms actually visited remained so small, the team decided not to do any statistical analysis of the results, and to be very careful with drawing conclusions from these data.



Table 2 Farms producing for egg powder plants - Contacted or Visited

Farm Code	Month	Area of Visit	Type of Unit
SKM1	December 2009	Namakkal, Tamil Nadu	Layer poultry farm; presently supplies eggs to SKM industries
SKM2	March 2010	Namakkal, Tamil Nadu	Layer poultry farm, supplying to SKM
OVO1	February 2010	Mysore, Karnataka	Layer poultry farm, supplying to Ovobel Foods Ltd
OVO2	February 2010, revisited in March	Mysore, Karnataka	Layer poultry farm, supplying to Ovobel Foods Ltd

Table 3 Other poultry farms contacted or visited

Farm	Location of Farm	Affiliation
Kegg Breeder Farm	Hosur Road, Tamil Nadu	Kegg Farms, Delhi
NN1	Bengaluru, Karnataka	NECC, Zonal Branch Bengaluru
NN2	Pune, Maharashtra	Private company
NN3	Namakkal, Tamil Nadu	Local traders association

Veterinary colleges and universities

Of 32 veterinary colleges in India, the following colleges were contacted:

Veterinary College, Bengaluru, Karnataka Veterinary and Animal Sciences University

Veterinary College, Hissar, Haryana Agriculture University

Veterinary College, Nagpur, Maharashtra Animal and Fisheries Sciences University

Veterinary College, Bombay, Maharashtra Animal and Fisheries Sciences University, and

Veterinary College, Namakkal, Tamil Nadu Veterinary and Animal Sciences University.

A conference on the "Indian Poultry Sector and Global Scenario" at the Bombay Veterinary College provided a valuable platform for contacting of key informants. Interaction with the head of the Veterinary Public Health department at Bombay Veterinary College gave valuable insights into the sector, as well as key information on the laws and regulations governing egg powder exporting units.

Research institutes

Institutes contacted included:

Research and Information System for Developing Countries, New Delhi (RIS)), as they have extensively studied the trade, especially related to egg powder.

Compound Feed Manufacturers Association of India (CLFMA)

Indira Gandhi Institute of Development and Research (IGIDR)

Confederation of Indian Industries (CII)

South Asia Pro Poor Livestock Policy Program (SA-PPLPP).

Government organisations

Government organizations visited or contacted included

Agricultural Products Export Development Authority of India (APEDA)

Export Inspection Council of India (EIC). These organisations work under the Ministry of Commerce and Industry. The legal aspects of egg powder trade are specifically controlled by state-level agencies of the EIC and described in chapter 4.

National Meat and Poultry Processing Board of India, which functions under the Union Ministry of Food Processing and takes initiatives for egg powder production and export

Ministry of Animal Husbandry Government of India

Animal Welfare Board of the Government of India, under the Ministry of Environment & Forests.

State level, Animal Husbandry Departments

National Bank for Agriculture and Rural Development (NABARD); a representative, Dr. Sudarshan, attended the workshop described before.



The European Union

The EU's office in India was also contacted and the first Secretary of the delegation of European Union to India was invited for the workshop in Pune. Unfortunately, she could not attend the workshop and could not be visited.

2 Background - Good Agricultural Practices, Food Safety and Animal Welfare

2.1 Good Agriculture Practices

Countries that have an export orientation are generally more advanced in the way that poultry value chains are organized and manage risks (Thieme and Pilling, 2008). Such countries are implementing various measures to regulate the type and location of poultry production and sales. Examples include specifying production zones, banning production and sales within city limits, restricting certain types of production, and specifying “farm standards”.

Increasingly, the concept of Good Agricultural Practices (GAP) is gaining importance in international trade. The recent virus outbreaks that the poultry industry has been facing, play an important catalyzing function. Standards related to Good Agricultural Practices may soon become part of WTO negotiations (Bracke, 2009). The Technical Barriers to Trade (TBT) Agreement defines WTO members’ rights and obligations in development and application of technical regulations. Increasingly, exporting countries will be required to abide by the technical requirements, which may be part of overall GAP.

At international level, and particularly in Europe, issues of animal welfare, antibiotics use, and ground water quality are becoming major concerns. In the EU, regular poultry cages have to be done away with by 2012. There is no such concern in India as of today, but considering the globalization and international trade in poultry products these issues may become live in India soon, due to pressures from importers in countries like Western Europe and the USA (Mehta et al., 2002).

Industry experts feel that to boost exports from India, investments in veterinary systems and training for skilled manpower are needed. Other indispensable supports needed include infrastructure like laboratories for feed & product testing, disease monitoring and technology for Good Manufacturing Practices (GMP) and Hazard Analysis Critical Control Points (HACCP) implementations. The Government of India considers developing guidelines for hatcheries and farm management practices for reference by the commercial sector.

While acceptance of GAP may be relatively straight forward for commercialized poultry production, in backyard poultry economic constraints and lack of a clear reporting mechanism seem to be key barriers in promoting Good Agriculture Practices. In the context of India, while 40 % farmers have access to crop-related information, only 5 % have access to information related to animal husbandry, according to a survey by the National Sample Survey Office.

This chapter further focuses on GAP standards in the areas of food safety and animal welfare.

2.2 International Trade and Food Safety

In the egg powder for export value chain, concerns for food safety relate to disease outbreaks in the poultry industry, food safety standards linked to international trade in general, and requirements of importing countries in particular. Key concerns for egg powder buyers concern its shelf life and presence of residues. Hence it is important to meet regulations in consuming countries. Two organizations play a key role in standard setting: WTO and IEC.

2.2.1 Role of the WTO

All products of animal origin entering the EU are subject to import controls. Further, Article 20 of the General Agreement on Tariffs and Trade (GATT) allows governments to act on trade in order to protect human, animal or plant life or health, provided they do not discriminate or use this as disguised protectionism¹.

In addition, there are two specific WTO agreements that deal with food safety and animal & plant health safety (one on health regulators for farm products and one on product standards in general). Both try to address issues regarding application of standards and at the same time avoid disguised protectionism. These issues are acquiring greater importance as tariff barriers are lowered. In both cases, if a country applies international standards, it is less likely to be challenged legally in the WTO than if it sets its own

¹ http://www.wto.org/english/thewto_e/whatis_e/tif_e/agrm4_e.htm, Food safety and WTO, April 2010.

standards.

The separate **agreement on food safety and animal & plant health safety** (the Sanitary and Phytosanitary Measures Agreement or SPS) sets out the basic rules. This allows countries to set their own standards, provided they are based on science. They should be applied only to the extent necessary to protect human, animal or plant life or health. And they should not arbitrarily or unjustifiably discriminate between countries where identical or similar conditions prevail. Member countries are encouraged to use international standards, guidelines and recommendations where they exist. When they do, they are unlikely to be challenged legally in a WTO dispute.

The **product standards** agreement still allows countries to use different standards and different methods of inspecting products. How can an exporting country be sure that the practices it applies to its products are acceptable in an importing country? If an exporting country can demonstrate that the measures it applies to its exports achieve the same level of health protection as in the importing country, then the importing country is expected to accept the exporting country's standards and methods. The agreement includes provisions on control, inspection and approval procedures. Governments must provide advance notice of new or changed sanitary and phytosanitary regulations, and establish a national enquiry point to provide information. The agreement complements the one on technical barriers to trade².

2.2.2 Role of the OIE

The International Animal Health Organization (OIE) is the internationally recognised body to work on globally acceptable standards for food safety². The OIE, in response to the demand for safe food from consumers worldwide, is working with relevant organisations to reduce food-borne risks to human health due to hazards³ arising from animal products. The OIE Strategic Plan 2001-2005 recommended that "OIE should be more active in the area of public health and consumer protection" and noted that this should include "zoonoses and diseases transmissible to humans through food, whether or not animals are affected by such diseases", with the object of improving the safety of the "food production to consumption continuum" worldwide.

OIE's permanent Working Group on Animal Production Food Safety (APFSWG) was established in 2002 to coordinate food safety activities. Its membership includes internationally recognised experts from the FAO, WHO and the Codex Alimentarius Commission (CAC), and has broad geographic representation. The OIE Strategic Plan 2006-2010 recommended that the APFSWG "continue to work with other relevant organisations, especially the CAC, in reducing food-borne risks to human health due to hazards arising from animals".

The APFSWG has drawn up a detailed work programme for the development of standards relevant to animal product food safety, covering hazards that arise on farm and at slaughter, with a primary focus on measures applicable at the animal production level. The APFSWG recognises that the goals of the OIE can only be achieved by working in collaboration with the WHO, the FAO and their subsidiary bodies, particularly the CAC. This is essential to avoid contradictory standards, to address gaps between current standards, and to ensure effective use of available expertise. The APFSWG identifies as priorities: to develop joint OIE-CAC standards, to address gaps and duplication in standards, and to develop procedures for mutual recognition of standards³. See chapter 5 for more detail on CAC and other standards.

2.2.3 Food safety standards in developing countries

Food safety standards in developed countries tend to be rather stringent. Developing countries that cannot match up to the standards of the EU, Japan or the USA may see food safety as an issue used as a convenient guise for protectionism. It is also believed that the EU constantly raises its food safety standards, using the consensual technocratic processes of the OIE to defend itself against imports of livestock and livestock products from developing countries (Nelson et al., 2004). Food safety, along with animal welfare, is one of the more recent issues in reforms of the Common Agricultural Policy of the EU and is considered a fairly complex subject.

It is well known that the WTO Agreement on the application of sanitary and phytosanitary measures lays

² http://www.oie.int/eng/secu_sanitaire/en_introduction.htm, Food safety and OIE, April 2010.

³ a **hazard** is defined as a biological, chemical or physical agent in food with the potential to cause an adverse health effect in humans

down the basic rules for food safety for human, animal and plant health standards. It is also known that it allows countries to set their own standards, provided they are based on science. However, since these standards are very stringent, many countries have difficulty in implementing them nationally.

2.3 Animal Welfare Practices in Poultry

Across the globe, cruelty to animals such as horses, dogs, and circus animals has largely been addressed through the efforts of animal welfare organisations. In the context of farm animals, concern for animal welfare is focused on intensive systems of production and handling during transportation and slaughtering. Issues related to transport and slaughter tend to 'precede' concern about how farm animals are housed. Key issues in transportation include loading and unloading, long travel distances and waiting periods, and use of unsuitable trucks (Bracke, 2009). Other concerns includes slaughter and pre-slaughter management, provision of adequate feed and water, rough handling of animals, culling of animals that are unhealthy or of low commercial value, and keeping animals under conditions for which they are not genetically suited.

Good Animal Welfare is considered an integral aspect of Good Agriculture Practices (GAP). Good animal welfare practices can contribute to food safety and production efficiency. Animal welfare issues have been of increasing concern in developed countries like the USA and EU countries. Drivers for adoption of animal welfare practices could be export concerns, societal pressure or pressure from consumers. Considering globalization and the international trade in poultry products, these issues are assuming significance.

Animal welfare standards originate from voluntary welfare codes by industry organizations, from corporate programmes, from product differentiation programmes, from legislated standards, and from international agreements. However, the essential consumer willingness to pay for animal-friendly products in the supermarket is still lagging - introducing animal welfare practices usually has cost implications.

2.3.1 Accepted definition of animal welfare

Animal welfare encompasses four welfare quality principles i.e. good feeding, good housing, good health, and appropriate behaviour (Bokma-Bakker and Munnichs, 2009). Good animal welfare practices include prevention and treatment of disease and injury; prevention and mitigation of pain, distress and other negative states; and providing diets and living conditions that are suited to the needs and nature of animals. A widely accepted definition of Animal Welfare as the Five Freedoms is included in Box 1.

Box 1 - Definition of Animal Welfare

The Five Freedoms

1. Freedom from Hunger and Thirst - by ready access to fresh water and a diet to maintain full health and vigour.
2. Freedom from Discomfort - by providing appropriate environment including shelter and a comfortable resting area.
3. Freedom from Pain, Injury or Disease - by prevention or rapid diagnosis and treatment.
4. Freedom to Express Normal Behaviour - by providing sufficient space, proper facilities and company of the animal's own kind.
5. Freedom from Fear and Distress - by ensuring conditions and treatment which avoid mental suffering.

The concept of Five Freedoms originated with the Brambell Report of the Technical Committee to Enquire into the Welfare of Animals kept under Intensive Livestock Husbandry Systems (1965). This stated that farm animals should have freedom “to stand up, lie down, turn around, groom themselves, and stretch their limbs,” a list that is still sometimes referred to as Brambell’s Five Freedoms. As a direct result of the Brambell Report, the Farm Animal Welfare Advisory Committee (FAWAC) was set up in England, later transformed into the Farm Animal Welfare Council (FAWC). One of these agencies began to list the provisions required for farm animals in five categories, which also came to be known as the Five Freedoms. The concept was subsequently refined by FAWC until it took the present form of the five freedoms.

It has always been difficult to measure animal welfare. For example the relationship between of animal welfare with externally driven design parameters like cage size is not clear. On-farm animal welfare measures may lead to bio-security risks. No cost-effective automated recording devices for animal-based welfare parameters are available on the market. There is also a need for internationally accepted standards on animal welfare. Enforcement in relation to welfare legislation across the globe is an issue. However, opportunities exist to connect economic motives (trade) to ambitions to improve animal welfare. The OIE is developing internationally acceptable standards of animal welfare.

2.3.2 Present EU standards

Not all countries in the EU have the same standards for welfare of farm animals. Scandinavian countries and Switzerland are far ahead of other countries. Western European countries, in turn, are ahead of Eastern European countries. However, radical changes in cages have been recommended for all countries within the EU; from 2012, enriched cages where laying hens have at least 750 cm² of cage area per hen are the only cages permissible.

Animal welfare organisations have constantly demanded that animal welfare enter trade negotiations, so that non-European countries also adhere to the Five Freedoms. This has raised concerns in some developing countries that animal welfare may become another non-tariff barrier limiting their access to markets. Developed-country producers, on the other hand, are concerned that the extra costs they incur to comply with legislation and standards in their domestic markets makes their products uncompetitive compared with imports.

2.3.3 Standards of other countries relevant to international trade

The USA has no legislation with regard to poultry welfare. Ninety five percent of eggs produced in USA come from cages (Bracke, 2009). In the USA, guidelines for poultry welfare are developed by the industry and 80% of the industry has agreed to follow these. The USA Industry Association guidelines include more space for hens in cages, conditions for moulting and standards for beak trimming. Standards in the USA are lower than in the EU.

The third major exporter of egg powder to the EU, Argentina, has promulgated partial legislation not directly related to animal welfare, but to connected topics. However, public and private institutions oriented towards animal welfare have published guidelines and reference manuals for implementation of animal welfare. They generally adhere to the concept of five freedoms (van Horne, 2010).

Other governments have taken initiatives to establish Animal Welfare Boards and enact laws for the prevention of cruelty to animals. In New Zealand and Australia, legislation and strong consultation procedures at governmental and community level strive to regulate and improve the welfare of animals in all spheres. To address the problems of animal welfare in developing countries, it would be inappropriate to adopt the international standards that are implemented in the developed countries. Each developing country should evolve its own standards based on its own individual priorities (Rahman et al., 2005).

2.3.4 Animal welfare in India

Compassion towards all living beings is the underlying concept behind animal welfare in traditional India society. Three religions in India teach the concept of non-violence or *ahimsa*, namely, Jainism, Buddhism and Hinduism. Under Jainism, caging or tethering of animals as well as their slaughter is prohibited, and Jains in India are vegetarian. Unlike the Judeo-Christian tradition, Buddhism affirms the unity of all living beings, all equally possess the Buddha-nature, and all have the potential to become Buddhas, that is, to become fully and perfectly enlightened. Buddhists also believe deeply in *ahimsa* or non-violence. While some Buddhists eat meat, they have their own philosophy governing the slaughter of animals. Hinduism

also preaches *ahimsa*; there are many rules and taboos governing the slaughter and consumption of meat. Many butchers in India are Muslims and the preferred method of slaughter is *halal*⁴. As an example, since taking life is prohibited, euthanasia is not widely practised. Old and suffering animals are to be taken into a shelter and nursed till they recover or die naturally. Most traditional farmers who raise domestic animals keep them till their end.

These religious beliefs and preferences continue and dominate treatment of animals, leading to many conceptions and misconceptions related to animal welfare as perceived by Indians as well as by people from outside. When viewed from industrialised secular societies, these values may seem obsolete and outmoded.

Conflicts in animal welfare under industrial systems

Industrial forms of livestock rearing are fairly new in India and driven by financial logic and the market. Practices and technologies have largely been handed down by Western developed countries. Many Indians find it difficult to accept such practices. Contrary to religious sentiments that prevent confinement of animals or their unnecessary killing, new industrial systems of rearing confine animals to restricted spaces, encourage slaughter of unwanted and diseased animals, encourage practices such as beak trimming, separating young ones from their mothers, synchronising births, medications, organised slaughter, etc. Just as the debate around welfare of laying hens remains unresolved in Western countries, the debate in India is likely to continue and even get fiercer.

The situation of laying hens illustrates the conflict between the physical, mental, and natural aspects of welfare and how difficult it is to harmonise them. Different animal welfare groups have different positions and values. This leads to discord, as they attempt to reconcile animal welfare with the farmer's need to earn a living.

Conventional cages do not permit hens to express their nature (roost at night, dust-bathe and lay eggs in seclusion). This limitation has contributed to the view that conventional cages are unacceptable and that hens bear too many of the costs of egg production. Therefore, in the case of laying hens, non-cage systems have been advocated, so that the birds might live more according to their nature and thus avoid the frustration of close confinement in barren cages. However, cannibalism is seen in non-cage systems, perhaps because hens are not adapted to living in the large groups involved in non-cage systems. These systems also carry a greater risk of human disease due to more intensive contact with the birds. And they are more labour-intensive than conventional cages. While cannibalism can be controlled by beak-trimming, it raises welfare questions as this causes neuromas and chronic pain. Conventional cages are considered more desirable in financial and humane terms. Veterinarians in the USA and Canada have accepted this compromise. The EU has ruled that barren cages need to be phased out of all member countries by 2012 and that more space be provided for birds in the interim. Both sides represent a compromise, the acceptability of which depends not only on scientific evidence, but also on societal values (Hewson, 2003).

The potential increase in the production costs under EU sanctioned alternative systems is estimated at 5% to 50%, depending on the system used. This will increase the cost to consumers. The premise of the ruling is that animal welfare is a public good that society must pay to protect. However, some animal welfare scientists argue that there is insufficient scientific evidence to justify the ruling and that welfare may be worse because of it. Other scientists support the ruling, arguing that inadequate husbandry and the current market conditions reduce welfare compared to the housing systems required by the EU ruling.

The Animal Welfare Board of India

In India, livestock welfare is administered by the Animal Welfare Board of India (AWBI) established under the Prevention of Cruelty to Animals Act (1960) – see par 4.2. AWBI plays an important role in monitoring the role of non-governmental organisations (NGOs) involved in animal welfare; assisting them both technically and financially and functioning as a watchdog for all animal abuse (Rahman, et al., 2005).

The Societies for Prevention of Cruelty to Animals (SPCAs), NGOs and *Goshalas* (shelters for cattle) are presently involved in animal welfare, funded and monitored by the AWBI.

According to the 11th Five-Year Plan of the Government of India⁵, the growth and expansion of the AWBI has remained limited compared to the total livestock population. Its focus has remained confined mostly to anti-rabies vaccination in dogs, control of dog populations in urban areas, and supervision of *Goshalas*

⁴ Muslim system of animal slaughter wherein, when an animal is slaughtered, the jugular vein is cut and the blood is allowed to drain from the animal.

⁵ Planning Commission, Government of India, <http://planningcommission.nic.in/plans/planrel/fiveyr/welcome.html>.

in rural areas. Further, there is no mechanism to involve or utilise the functional network and facilities of veterinary services under the Animal Husbandry Departments.

UNICEF, in partnership with MOHFW, the Department of Agriculture, NICD and WHO is formulating a nationwide communication campaign to promote safe poultry handling behaviours and to spread awareness about measures to prevent pandemics like HPAI (highly pathogenic avian influenza).

NGO's in animal welfare in India

Most animal welfare organizations in India are against industrialized systems of poultry management, but tend to be overburdened with other issues of animal welfare. Poultry related initiatives include:

CUPA - Compassion Limited Plus Action, an NGO based in Bangalore, conducted a study on the transport of poultry into cities. Industrialized poultry systems are one of many issues that CUPA would like to engage with, but has not yet managed to.

HSI - Humane Society International is focusing on the plight of hens in battery cages, asking egg producers to shift away from the use of these systems and towards cage-free housing that allows birds the freedom to stretch their wings, walk, and lay their eggs in nests⁶.

Box 2 - HSI campaign on attitudes around battery cages

According to HSI, approximately 80 percent of egg production in India occurs in battery cages, impacting around 100 million egg-laying hens. Seventy-five percent of eggs are consumed by 25 percent of the country's population, specifically those living in urban areas. Most of these urban consumers can afford to pay a higher price for food produced in a more natural, healthy, and ethical manner.

Since the start of their campaign, HSI has spoken with over 100 Indian egg producers (each rearing anywhere between 5,000 and 100,000 hens). Very few have argued about the animal welfare benefits of cage-free systems, agreeing that the birds are better off without cages. Their only concerns were economic: the cost of producing cage-free eggs is higher than the cost of cage eggs. This is due to the lower density of birds, additional husbandry requirements, and the potential for increased feed consumption. Some producers were worried that a lot of capital has been sunk into their battery cage facilities. If a producer switched to cage-free, how would he be able to compete with those who were still using battery cages? One person suggested that the government impose a ban on battery cages - that way there would be a level playing field for all producers.

All battery-cage egg producers that HSI interacted with are supposed to have said that they would switch to cage-free systems once the consumers started to demand them. HSI feels it is the Indian consumer who should lead the change in the Indian egg industry. However as mentioned elsewhere in the report the Indian consumer is poorly informed about animal production and animal welfare issues and is thus not yet in a position to lead change.

⁶ http://www.hsus.org/about_us/humane_society_international_hsi/hsi_asia/indias_poultry_industry_1208.html

3 The Egg Powder Industry in India

“I think if required on pain of death to name instantly the most perfect thing in the Universe, I should risk my fate on the bird’s egg.”
T.W. Higginson (1863)

3.1 The Poultry Sector

The commercial poultry sector in India started around the 1960s. Spurred by various private entrepreneurs, and with considerable encouragement and support from the Indian government, today it is a thriving indigenous industry. It is one of the fastest growing agri-businesses in India, growing at a much faster rate than any other segment of the crop - and livestock sector. It is estimated that the Indian poultry industry provides direct and indirect employment to over four million people, particularly in rural areas, and contributes about Rs.40,000 crore (around Euro 60 billion) to the national GDP (Kumar, 2008; Landes et al, 2004; Anand, 2010).

Within the poultry sector, the layer industry is expected to maintain a compounded growth of 7-8% per annum over the coming decade. Supporting factors include the availability of quality chicks, assured returns, availability of bank credit, availability of trained human resources, and good understanding and knowledge of improved methods of feeding, management and health control (Kumar, 2008; Anand, 2010).

A few integrators have successfully managed to put in place production facilities for almost all the major inputs, including feed, day-old chicks, parent stock, and hatcheries. Some own pure parent lines. The effort is now to put in place a network of contract growers with a buy-back arrangement. The key players have moved into vertical integration by setting up retail chains, processing, branding and aggressively marketing their produce (CLFMA, 2005). Vertical integration is envisaged to promote industry growth by enhancing production and marketing efficiency, and reducing consumer prices. In India, the gains in marketing efficiency appear more significant than in production efficiency (Landes et al., 2004).

Table 4 Indicators of Growth and Development of the Poultry Sector in India

Year	Egg production (million)	Per capita annual egg availability	Broiler production (millions)	Chicken meat production (thousand tonnes)	Per capita availability (grams)
2002	38,729	38	1,400	1,400	1,330
2003	39,823	39	n/a	1,600	1,500
2004	40,403	40	n/a	1,650	1,530
2005	45,201	42	2,000	1,900	1,730
2006	46,166	42	n/a	n/a	n/a

Source: FAOSTAT and Ministry of Agriculture (2006), GOI & Watt Poultry Statistical Year Book (1998 and 1999)

Table 5 Egg Production of Five Top Egg-Producing States (Million Nos.)

Year	State					Total	Percentage of country total
	Andra Pradesh	Maha-rashtra	Tamil Nadu	Punjab	West Bengal		
1997-98	5.7516	2.7663	3.2168	2.9103	2.6341	17.2791	60
1998-99	5.9248	2.9377	3.5866	2.6300	2.6532	17.7323	60
1999-00	6.3450	3.0619	3.8454	2.7819	2.6713	18.7055	61
2000-01	11.8000	3.0985	3.9294	2.9640	2.6920	24.4839	67
2001-02	13.3151	3.1942	4.2242	2.9613	2.7101	26.4049	68
2002-03	14.8622	3.2950	3.6222	3.1306	2.7490	27.6590	69
2003-04	14.9928	3.3755	3.7836	3.0681	2.8204	28.0404	69
2004-05	15.8040	3.4362	6.3948	3.6800	2.8877	32.2027	71
2005-06	16.4534	3.5227	6.2225	3.5200	2.9637	32.6823	71

Source: State/Union Territory Animal Husbandry Department (2006)

Poultry development in the country has shown steady progress over the years. It enjoys a global competitive advantage because of the comparatively low cost of production due to low feed prices. The industry has attained productivity of about 315-320 eggs per 52 weeks, considered to be the best in the world. India is the third largest producer of eggs in the world and the compounded annual growth rate for egg production was 6% between 1980 and 2000. This growth rate went down to 5% in the years 2004-2008. Egg production reached 57 billion eggs in 2007-08, from 21 billion in 1990-91 (DAHD, 2009). The growth rate in value added products like egg powder is estimated to be 15 to 30 %.

Although currently there is an unmet demand for eggs in India, the integration in the layer industry has led to falling prices of poultry products. A twin track approach may support India to meet the unmet demand for eggs, with backyard and industrial systems continuing to exist within the same country (Thieme and Pilling, 2008).

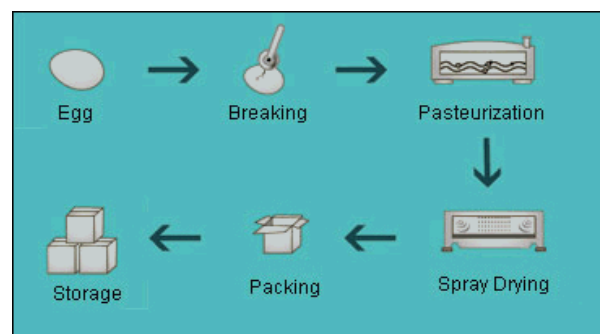
Andhra Pradesh is the leading state in egg production followed by Tamil Nadu, Punjab, Maharashtra and West Bengal. Their joint share in the national production is rising and now stands at 71% (Das Kornel, 2008). India contributes only 0.5 % of egg exports in the world (Reddy, undated). India exports table eggs to countries like UAE, Kuwait and Oman.

The increase in production has raised annual per capita availability of eggs from seven eggs in 1961 to 42 eggs in 2006, which is still low given that the recommendation is 180 eggs per capita (Das Kornel, 2008). Consumption levels are influenced by household income and by religious beliefs and resultant seasonal consumption of eggs; 25% of the urban rich consume 75% of the eggs produced (Jaysimha, 2010). A small fraction of the total eggs produced in the country is used by the confectionery industry and bakeries. A percentage is also used to manufacture egg powder.

3.2 The Egg Powder Industry

Most egg powder units were set up in the 1990s, to deal with surplus peaks in egg production. It was felt that exports of poultry products would grow, since cost of production per egg is low in India. Geographically, too, it was felt that India is ideally located to cater to Middle - and Far Eastern countries. Egg Powder Units can be registered with the Ministry of Food Processing Industries for availing subsidy benefits. They can also register as registered manufacturer exporter with RBI (Reserve Bank of India), DGFT (Directorate General of Foreign Trade) and APEDA (Agricultural Produce Export Development Authority) to avail export incentives.

Figure 1 - Egg powder production process



Export licenses for i.e. the EU can be obtained from the Export Inspection Council.

Initially seven units were started. In the South these were: Venkateshwara Hatcheries Ltd, Indo-Dutch Proteins Ltd (both in Hyderabad, Andhra Pradesh), Ovobel Foods Ltd (Bengaluru, Karnataka) and SKM Foods (India) Ltd (Erode, Tamil Nadu). In the North these were: Western Foods Ltd (Ambala, Haryana) and A.G. Foods Ltd (Ludhiana, Chandigarh). In the West this was Foods & Inn (Mumbai, Maharashtra). All these units were set up to cater to the export market, as Domestic demand for egg powder is only around 1000 MT, largely consumed by the Armed Forces. See appendix 3 for more detail.

These manufacturing units have state of the art technology and installed capacity of 0.6 to 1.8 million eggs per day (see fig.2). These units have come up in states like Tamil Nadu, Karnataka and Andhra Pradesh, where there is strong base of egg production.

Promoters of these units have strong experience and presence in the poultry sector in India.

Currently the following three companies have valid egg powder export licences from the Export Inspection Council of India:

1. SKM Industries Ltd.
2. Venkateshwara Hatcheries Egg Powder Division Pvt Ltd.
3. Ovobel Foods Ltd.

3.2.1 Actors in the value chain

The egg powder manufacturing units can be considered as the critical link in the egg powder export value chain. Other key actors in the value chain include poultry farms, which can be plant-owned or contracted. These farms purchase day old chicks from hatcheries.

Egg powder manufacturing units are linked to buyers in importing countries. Initial and sustained export market linkage has been critical in starting and running these egg powder processing units. Clients in the EU and Japan are the major buyers of egg powder. During the field study, these units moreover expressed that the ability to adopt and comply with food safety standards of importing countries is becoming critical for sustainability of their enterprises. Hence these units prefer to purchase eggs from specific poultry farms, where they will be in the position to ensure food safety standards. Currently, the best quality eggs are going for production of egg powder. In this context, GAP has assumed importance in the egg powder export industry.

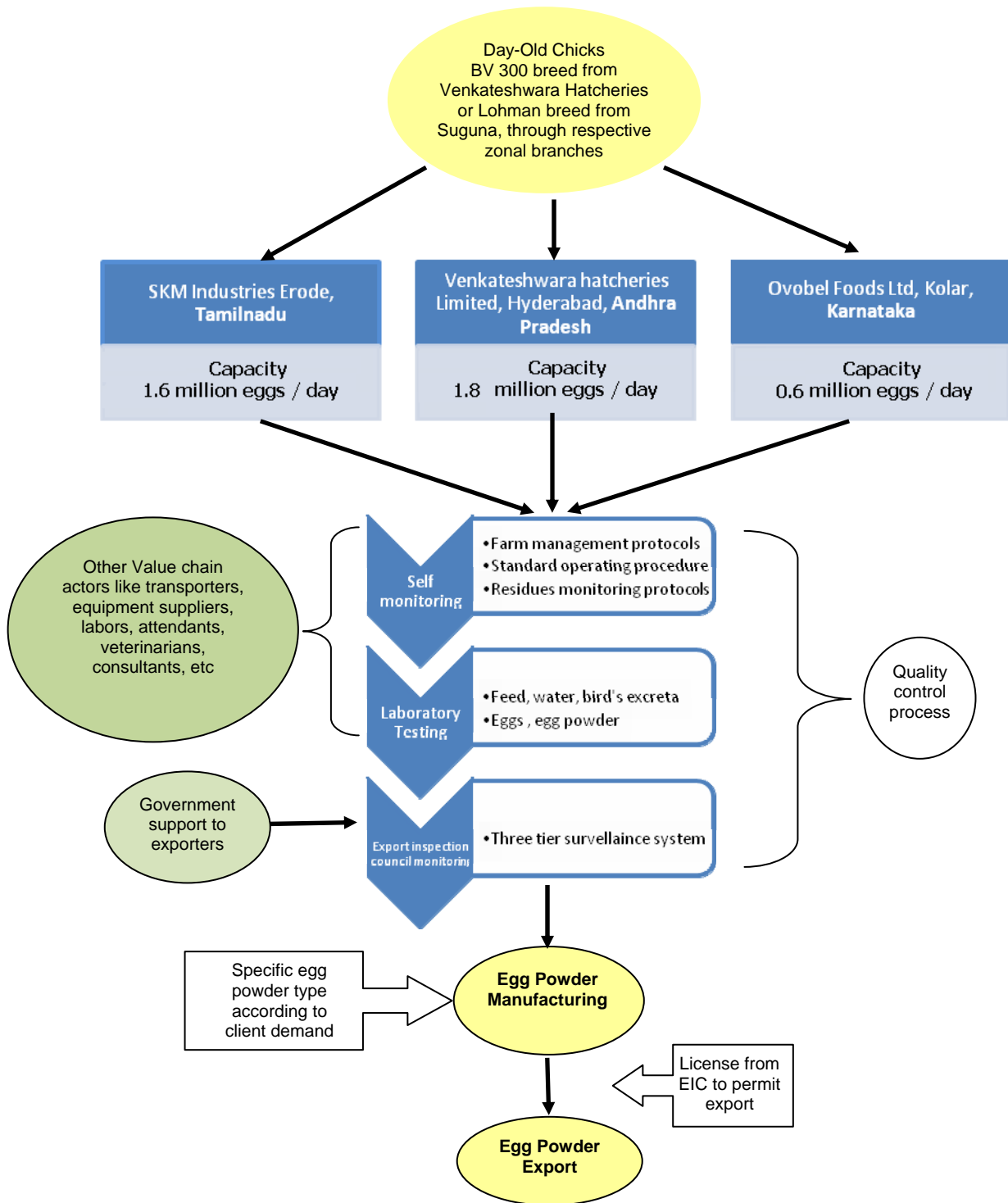
Poultry farms sell culled birds to slaughter houses in local or distant markets. Similarly, unused eggs at egg powder manufacturing units get sold in local markets. Other actors in the value chain include transporters of eggs and chicks, veterinary service providers and officials of the Export Inspection Agency.

Some of the egg powder export units have laid down procedures for selection of poultry farms. Preference is given to farms registered under EIA, isolated large cage farms, farms that have own quality control staff, and farms without past history of major diseases. Besides this, farms that are already following basic bio-security measures and whose practices are close to the unit's SOPs are preferred to supply eggs to egg powder manufacturing units.

The team could see the SKM egg powder manufacturing plant at Erode, Tamil Nadu. It was not possible to visit Venkateshwara egg powder manufacturing unit in Hyderabad as they kept postponing the date of visit. Visit to Ovobel Foods Ltd could not be scheduled due to internal problems in the unit. The team also had an in-depth interaction with the Assistant General Manager of SKM industries at his office in Erode, Tamil Nadu. The SKM unit has state-of-the-art facilities with financial support from TIDCO (Tamil Nadu Industrial Development Cooperation Ltd.). The research team saw the manufacturing unit, the laboratory for testing samples, and the dispatch unit. No outside vehicles are permitted within the factory. Dispatch trucks carrying material in and out of the factory are spray-washed. Visitors are only allowed to observe the plant through a glass viewing gallery. All staff wore uniforms and footwear provided by the company which they change into on arrival.



Figure 2 Indian egg powder industry for export to the European Union



3.2.2 Trade practices

Egg powder manufacturing units obtain eggs either from their own poultry farm or from contracted farms. There is no incidence of purchase of eggs from traders in open market. The contracted farms have capacity in the range of 50,000 to 300,000 eggs per day. As part of the contract, rates for eggs are negotiated and fixed for the contract period (usually one year). At times the price negotiated could be a floating rate, i.e. an amount or percentage over and above the prevailing market rate.

Some of the poultry farms feel that the international price of egg powder is not growing at a comparable rate to the growth of the domestic price. This may also affect growth of egg powder export industry in India. At times egg powder units are following their own standards (beyond international) to cater to the

fluctuating market demands. This may negatively influence contractual relationships between poultry farms and the egg powder unit.

All egg powder units have specific interests to see that prescribed standards are followed at farm level. They suggest SOPs to be followed and appoint an agency or their own person to monitor whether SOPs are being followed. The level of adherence to SOPs can be expected to vary between export units and between concerned poultry farms.

3.3 Egg Powder Export from India

The main export markets for India's table and hatching eggs are Kuwait, Oman, Saudi Arabia, the United Arab Emirates and Yemen. India also exports live poultry in the form of day-old chicks (DOCs). The main export markets for India's live poultry are countries of the SAARC (South Asian Association for Regional Cooperation) region.

Germany, Austria, the Netherlands, Japan, and South Korea have been the most important markets for India's egg powder. EU based companies distribute egg powder from India, the USA, Argentina and EU-based plants to clients all over the EU. Egg powder is normally used by bakeries, confectioneries, in pastas and for cosmetics.

All seven egg-processing units that were set up initially were exporting to the EU. In recent years, there has been a reduction of egg powder production in India mainly due to fall in price in the international market, imposition of a heavy import duty by importing countries, and EU's requirement for a pesticide residue monitoring plan (CLFMA, 2005).

The frequent changes in food safety standards in India's destination markets, particularly the EU, thus have raised several impediments for Indian processors. These factors led to the closure of three out of seven units (Mehta et al., 2002). In 1996, the EU de-listed India from the list of approved countries for import of egg powder on grounds that these units had not submitted their residue-monitoring plan (RMP). Since then, the EIC has produced the RMP shown in Appendix 4. As a result, export of egg powder, which stood at \$28.77 million in 1997, declined drastically to \$13.62 million in 2000. Due to the resulting slump in sales in the EU and a declining demand from Japan, egg powder exports declined sharply in 1998. The slump continued till 2000, after which it started to recover.

Currently, in 2010, only SKM Industries (Tamil Nadu), Ovobel (Karnataka), and Venkateshwara Hatcheries (Andhra Pradesh) are actively producing egg powder for export to Japan, USA and the EU. Figure 2 outlines the production and marketing process and the place of these companies in the value chain.

The Indian egg processing industry has to constantly upgrade its testing facilities, to meet the challenges of export. To overcome the constraints of residues, close monitoring of finished products and effective farm-level supervision have been introduced. The companies have introduced a self-monitoring system to ensure that residues of antibiotics, pesticides, organic acids, veterinary drugs, etc., are checked routinely and effectively at farm level. The self-monitoring system is spelt out to farmers who are supplying eggs to the egg powder processing units (Anand, 2010).

According to some researchers of the poultry sector (Mehta et al., 2002) exports from India are plagued by the following inherent problems:

- The absence of a single government agency to understand the supply-side problems of exports, including egg powder. Matters get shunted from one ministry or department to another, affecting the country's exports.
- Difficulties in granting equivalence in the export of egg powder by external markets to countries like India. Even 10 years after the submission of a list of units to be notified, the EU apparently has not set up a commission to inspect these units and grant equivalence.
- Non-acceptance of domestic certification. Invariably, the test certificates issued by Indian laboratories are not accepted by the EU or other developed countries, as they are not accredited to laboratories in the developed countries.
- Environmental and welfare issues adopted by the EU have begun to adversely impact the export performance of developing countries like India.

3.4 Support to the Sector

Professors from poultry science departments of the state veterinary colleges often act as consultant and guide for poultry farmers in their respective poultry belts. For instance, professors of the Tamil Nadu Veterinary College, which is situated near the town of Namakkal (also known as the poultry hub of India), provide consultancy to the farms located there. Professors are consulted by farmers for disease diagnosis, safe and effective medicines and improvement in SPS measures. Farmers also consult professors to get updated about new trends in poultry research in these colleges.

4 Legislation - Standards and Regulations affecting Export of Egg Powder

4.1 Indian legislation governing safety and quality of egg powder

A number of laws, standards and regulations govern food safety and animal welfare in India. Specifically for egg powder production and its export, the Government of India has standards and regulations which, although mainly governed through the Ministry of Commerce and Industry, are also influenced by food safety rules set up by other Ministries. Moreover, guidelines from the sector and knowledge institutions also affect the institutional setting, as described in par 4.1.4 and 4.1.5.

India's food control system' involves several national, state and municipal organizations for the regulation, inspection and analysis of food and agricultural products, together with their supporting legislation and rules and compliance activities. Table 6 outlines these agencies and the legislation governing food quality in the country that they are responsible for.

In order to rationalize the multiplicity of food laws, the Ministry of Food Processing Industries of the Federal Government of India has enacted the Food Safety & Standard Act (FSSA), 2006 (see table 6). Compliance under this Act is necessary to set up an egg powder manufacturing unit.

Table 6 India: Different Ministries/Acts Dealing with Food Safety in the Poultry Sector

Central Government Ministries	Act	Details of the legislation
Ministry of Agriculture	Insecticide Act , 1973	The Insecticide Act lists banned and restricted pesticides.
	Meat Food Product Order , 1973	The Meat Food Product Order gives licences to agencies involved in the production of poultry meat.
	Agricultural Produce (Grading and Marking) Act, 1937, amended in 1986 (AGMARK Act)	This act promotes the standardization and grading of agricultural food commodities by pre-testing and certification under the General Grading and Marking Rules, 1986 and 1988. Products such as cereals, honey, butter, ghee, edible oils, and spices are certified under AGMARK.
Ministry of Health & Family Welfare	Prevention of Food Adulteration Act , 1954	Governs most aspects related to food safety; specifies food safety and quality standards for consumer protection; it is the basic statute intended to protect consumers from supply of adulterated foods.
Ministry of Food Processing Industries	Fruits & Vegetable Products (Control) Order – FPO, 1955	Previously responsible for setting up and promoting egg powder units. Egg powder units now come under the Ministry of Commerce and Industry.
	Food Safety & Standard Act (FSSA), 2006	Covers standards relating to specifications for ingredients, contaminants, pesticide residues, biological hazards, and labels.
Ministry of Commerce and Industry	Export (Quality Control & Inspections) Act , 1963	The Ministry of Commerce and Industry is the main agency responsible for ensuring that products match export standards of different countries. This legislation aims at ensuring the development of export trade of India through quality control and inspection by the EIC and EIAs. WTO and the SPS Agreement have given significance to the role of certification in assuring the quality and safety of food products. The role of EIAs has been reoriented by putting into place a system of certification covering both product and systems aspects, in line with international requirements, with a view to facilitating export.

Ministry of Civil Supplies, Consumer Affairs and Public Distribution	Standards of Weights & Measures (Enforcement) Act , Bureau of Indian Standards (BIS) Act, 1986	Compliance to international standards. It formulates the standards of processed food products and operates under the voluntary certification scheme, ISI Mark. BIS is operating this certification scheme. The ISI Mark is mandatory for 47 food items and ingredients.
Ministry of Environment & Forests	Environment (Protection) Act , 1986, Environment (Protection) Third Amendment Rules, 2002	Governs animal welfare
Ministry of Consumer Affairs, Food and Public Distribution	Essential Commodities Act , 1955	This Act is administered through the states/union territories for regulating the manufacture and distribution of essential commodities, including food. While doing so, the Act also lays stress on the quality and hygienic aspects of food.

Sources: Mehta and George (2005); Paturkar (2010)

India prepared and implemented its own residue-monitoring plan for egg and chicken products. The Government of India, Department of Commerce, in December 2003 authorized APEDA to operate this residue monitoring plan (RMP) (see appendix 4). All egg processing units intending to process eggs for export, their affiliated feed mills, layer farms, and recognized laboratories are covered under these guidelines. The RMP describes and gives a list of pesticide residue limits applicable for egg products and provides a list of maximum residue limits for pharmacologically active substances.

The policy objective of the Government of India focuses on promoting effective regulatory institutions for dealing with environmental and health crises arising out of poultry and poultry products. States may demarcate backyard/core rural production pockets from commercial production pockets so that they do not pose any risk to each other. Poultry Disease Surveillance and Information system is being considered for creating a database for disease situations for further forecasting etc., or the existing Animal Diseases Services Information System (ADSIS) will be strengthened in terms of poultry diseases. In the commercial sector, starting from breeding operations and feed milling to processing, Good Manufacturing Practices (GMP) and Hazard Analysis Critical Control Points (HACCP) will be promoted for voluntary adoption. Safety issues linked to use of drugs and vaccines in terms of acceptable levels in end products for human consumption are issues that need to be tackled.

4.1.1 International standards

The following international standards are used for export of eggs and egg products. They govern quality of products and in India are mainly used for export products:

- **Codex Alimentarius Commission (CAC)**, attached to the Food and Agriculture Organization and World Health Organisation of the United Nations, sets guideline international standards for foodstuffs. CAC standards aim to protect the health of consumers and ensure fair practices in the food trade arena. The **CAC Food Code (CFC)** attempts to create harmonised standards. Prior to the SPS Agreement, the CFC could be adopted, applied and /or ignored at the discretion of a Government. However, the CFC has now been adopted as the benchmark within the SPS Agreement. Thus countries not imposing standards higher than CFC standards have the right to use these standards for their imports. CAC has incorporated HACCP plans and principles as an integral part of the CFC (Mehta and George, 2005). These standards include Maximum Residue Limits (MRLs) for agricultural and veterinary chemical residues, Maximum Permissible Concentrations (MPCs) for heavy metals such as cadmium, lead and mercury, and Extraneous Residue Limits (ERLs) for some environmental contaminant in foods. Standards are established for all types of raw and unprocessed foods and for some processed foods. These foods may be either of plant or animal origin, and be for consumption by humans or by farm animals.
- **United Nations Economic Commission for Europe (UNECE)** mostly deals with the standard for trade, marketing and commercial quality control in international egg product trade between and to UNECE member countries (adopted in 1986). This standard applies to hen's egg products for use in the food industry (for human consumption) and which are marketed as "UNECE QUALITY". These products may be in dried, liquid or frozen form, according to definitions used in the standard (app. 5).

4.1.2 *The Export Inspection Council*

Egg powder comes under the purview of the Export Inspection Council (EIC), which grants export certificates to egg powder exporting units and exporters of other commodities. The EIC is India's official export certification body under the Ministry of Commerce and Industry, Government of India. The council's mandate includes laying down the guidelines on the standards required for export of a particular commodity, as well as to conduct periodic inspection to check whether companies follow mandatory protocols. The EIC was set up in 1963 by the Government of India under Section 3 of the Export Quality Control and Inspection Act, in order to ensure sound development of export trade of India through Quality Control and Inspection and related matters (Sharma, 2010).

The EIC is an advisory body to the Central Government and under the Act is empowered to:

1. Notify commodities which will be subject to quality control and/or inspection prior to export,
2. Establish standards of quality for such notified commodities, and
3. Specify the type of quality control and/or inspection tools to be applied to such commodities.

Besides its advisory role, the EIC also exercises technical and administrative control over the five Export Inspection Agencies (EIAs), one each at Chennai, Delhi, Kochi, Kolkata, and Mumbai, established by the Ministry of Commerce and Industry, Government of India. They cater to specific poultry belts in those areas. For egg powder EIC has a specialised three-tier surveillance system to ensure implementation of regulations. This includes close monitoring by EIA officials, supervisory visits of farms and corporate audits of the whole egg powder processing unit. The local EIA issues licenses that permit export. These are valid for approximately two years after which they have to be renewed.

The EIC, either directly or through the five EIAs, renders services to Indian exporters in the areas of:

- Certification of quality of export commodities through installation of quality assurance systems (In-process Quality Control and Self Certification) in the exporting units as well as consignment-wise inspection.
- Certification of quality of food items for export through installation of Food safety Management System in the food processing units.
- Issue of Certificates of origin to exporters under various preferential tariff schemes for export products.

The procedure that EIC uses for the approval of egg powder establishments is included in Appendix 4. During the period of the study only three egg powder units in India had approval from the EIC.

4.2 **Legislation Governing Animal Welfare in India**

In India, legislation around livestock welfare is covered by the following two acts:

- The Prevention of Cruelty to Animals Act (1960), enacted by Parliament with the sole object of preventing infliction of unnecessary pain and suffering to animals⁷. The Animal Welfare Board of India (AWBI), established under this act, plays an important role in monitoring the role of non-governmental organisations (NGOs) involved in animal welfare; assisting them both technically and financially and functioning as a watchdog for all animal abuse (Rahman, et al., 2005). A number of rules have been framed under the said Act (see par 2.3.4.2).
- Transport of animals is governed by the Transport of Animal Rules, 1978 and the Transport of Animals (Amendment) Rules (GoI, 2001). Under this act, detailed instructions are given on how animals are to be transported, including poultry. Given the extreme climatic conditions found in India, ensuring appropriate methods of transportation is an important aspect of welfare.

⁷ At inception in 1962, AWBI was under the Ministry of Food and Agriculture; subsequently, in 1990, the subject of animal welfare was transferred to the Ministry of Environment & Forests and later to the Ministry of Social Justice and Empowerment in 1998. Presently, the Board is again functioning under the Ministry of Environment & Forests.

5 Knowledge, Attitudes and Practices on Food Safety and Animal Welfare

The findings in this chapter are based on interviews with key resource persons, value chain actors, and enabling agencies, as well as on observations by the assessment team on farms and factories visited. Within the general GAP framework, specific attention is given to food safety and animal welfare aspects. Some observations from the assessment are displayed as quotes.

5.1 Food Safety in the Poultry Industry in India

There is a growing realization in India that quality needs to be monitored throughout the entire food chain to ensure food safety from 'farm to fork'. As a result, the industry is shifting towards integration, leading to concentration of farms in limited geographical areas. This may pose a threat to animal health. The large-scale poultry operations of today may turn into the disease heavens of tomorrow, where even a disease of low virulence may seriously affect the entire flock. Therefore, bio-security is one of the most formidable challenges for both the rural and commercial set-ups (Mehta et al., 2002).

From bio-security point of view, poultry farms may be classified into different categories:

- industrial integrated system with high level of bio-security and birds/products marketed commercially (e.g. farms that are part of an integrated broiler production enterprise with clearly defined and implemented SOPs for bio-security);
- commercial poultry production system with moderate to high bio-security and birds/products usually marketed commercially (e.g. farms with birds kept indoors continuously; strictly preventing contact with other poultry or wildlife);
- commercial poultry production system with low to minimal bio-security and birds/products entering live bird markets (e.g. a caged layer farm with birds in open sheds; a farm with poultry spending time outside the shed; a farm producing chickens and waterfowl);
- village or backyard production with minimal bio-security and birds/products consumed locally.

The egg powder value chain described in this report entirely falls within the first category.

India has very successful breeding operations supported by research and development, bio-security measures, and strict quarantine for the breeder flocks. The breeding operations are supported by hatchery health and hygiene. The breeding flocks are subject to compulsory tests for salmonella (Das Kornel, 2008).

In India, the complexity of value chains having many players makes it difficult to maintain food safety. For example, live bird markets are common practice in India and they pose a risk of recirculation of poultry pathogens such as HPAI and a potential source of exposure of human beings to infected live birds. Food safety standards significantly affect exports. The Indian poultry sector recognizes that a well-integrated supply chain with a successful marketing strategy holds the key to exporting egg powder from India. Besides the export market, there has also been increasing consumer demand for clean, safe, hygienic, nutritious, properly packed, labelled and presentable eggs. Overall, consumer concerns and demand will drive promotion of food safety in the Indian egg industry.

The Indian egg powder industry, due to a past history of problems, has consciously worked towards improving levels of food safety. This is implemented at sector level and farm level.

5.1.1 Sector level GAP for food safety

A number of different rules, laws, and regulations govern food safety in India. The Prevention of Food Adulteration Act (1954) for domestic purposes and the Export Quality Control Act (1963) for export purposes were passed to regulate health & hygiene regulations for processing plants. The latter is implemented by the Export Inspection Council (EIC) of India, as described in paragraph 4.1.2.

The Indian Government is trying hard to harmonize its food standards with CAC standards and to bring all relevant laws under one agency, to avoid the problems arising from multiplicity of standards and implementation agencies. However, as a large number of the poultry operations are also undertaken by independent producers – hatchery operators, feed operators, commercial farmers, etc. - managing high food safety standards remains a challenge. At present, most of the emphasis on food safety is focused on export consignments (Mehta et al., 2002).

While Indian standards for egg processing plants have been derived from USFDA and EU regulations,

countries like Australia and Malaysia do not recognise these standards. Similarly, importing countries do not recognise the veterinary certificate issued by government-approved authorities like the Export Inspection Agencies and insist on a separate certificate issued by foreign consulting firms. In some cases, even importing companies have their own specifications which are at variance with their own national standards. This rather complex situation may contribute to the opinions that some Indian industry players have: that importing countries, particularly for egg products, are using these measures discriminately to hinder exports from India (Mehta et al., 2002).

The Indian poultry sector, particularly egg processing units, is integrating itself with the global system. The egg processing units in India are already HACCP compliant. Similarly, broiler processing units are in line for adoption of HACCP; many have already adopted it. But it would not be out of place to mention that only bigger units with sufficient manpower, infrastructure and financial strength can adopt HACCP and ISO-9000 type measures (Mehta et al., 2002).

Despite this, the Indian egg powder industry has made considerable attempts to overcome barriers such as pesticide and antibiotic residues and feels that it is fully equipped to meet all the necessary quality standards for egg products. The egg powder plants in Andhra Pradesh and Tamil Nadu are doubling their capacity, thereby increasing the scope for procurement and processing of eggs to supply to the EU and Far East (Anand, 2010).

5.1.2 Farm level GAP for food safety

India's commercial poultry sector is characterised by integration and contract farming; most integrated farms follow protocols set by the parent company. Fearing loss to disease and rejection of produce by the parent company, integrated farms comply with the required protocols. The larger the company, the higher the standards, as these companies are able to train farmers and to employ supervisors to conduct frequent checks. Definition and implementation of appropriate SOPs is an ongoing concern.

"The owner of the farm said that he finds value in following the protocol and is making every effort to adhere. However, there are challenges and some of the conditions in the protocol are yet to be fulfilled by his farm."

"Although there is no SOP given by Ovobel; the company has instructed them not to use any antibiotics and asked them to supply only fresh, clean and unbroken eggs."

"SKM Industries provides a supervisor for each farm who checks the farm operations and adherence to protocol."

"The farmer feels that the standards of Venkateshwara Hatcheries for the chick and layer management are not up to the current international standards. He claims awareness of these; therefore, he does not follow those protocols but has developed his own standards to meet the market demand. He believes that the market dictates the standards."

The farms buy good variety chicks from reputed companies. Separate sheds are used to rear different age groups. Most farms have their own feed mill within the farm compound. The poultry farms collect eggs daily and deliver to the factory on the same day. Eggs are packed in trays and are transported to the factory in trucks. As the truck enters the factory, the tyres are dry and wet cleaned.

"The sheds are covered with wire mesh and the roof with cement sheet; the sheds have natural ventilation during the day; in the evening, lights are put on to enable 16 hours photo period. The wire mesh is covered with tarpaulin to protect the birds from rain and cold weather."

"Typically, three women and one man are allotted for each shed of 20,000 layers for daily collection of eggs. Men usually pull the collection trolley while women collect eggs from each row. Women are preferred over male as labourers, as their wage rates are lower and they are gentler while handling the birds."

"The supervisor said that the water and feed availability and birds' condition are checked five times a day. They don't communicate with the birds as they did not feel it was essential. During the visit to the layer shed, the supervisor suddenly put his hand in the cage to take the egg out; the birds were scared and made noises."

"During the visit, dead birds were observed lying on the floor infested with houseflies. As reported by the shed supervisor, they are picked up every day and buried in the death pit."

"Chicks are reared in the chick shed from the 1st week to 8th week of age. The chicks are then shifted to the grower shed. The price of chicks varies over seasons. For rearing the chicks up to the grower stage, the hatchery provides a set of guidelines on the standard procedure to be followed at the farm."

"Birds are moved from brooder to grower shed and from grower to layer shed using plastic boxes; they are loaded in the van and unloaded and placed in cages. Previously, only water was used to clean the cages. Now flame guns are used."

Egg powder export units specify poultry farms to follow SOPs. In some cases, the protocol is quite prescriptive. Separate records are maintained for submission to egg powder units. Egg powder export units insist that farms do not use antibiotics. Generally, government-banned drugs are not used in the poultry farms. The egg powder export units takes responsibility (as part of the contract) to buy all the eggs produced in the contracted farms. The egg powder export unit takes responsibility to sell/dispose off the damaged, low quality or unused eggs in the local market. However, in some cases, they do not purchase all the eggs and suggest poultry farms to supply large fresh eggs only, avoiding supply of pullet or medium-size eggs.

“Ovobel egg procurement norms: Eggs should be in size range of 50gm-55gm or even up to 60gm. Medium eggs and pullet eggs are not accepted. In some disease situations, if antibiotics have to be used, the farms don’t supply to Ovobel. Eggs not suitable for Ovobel are sold in the local market.”

“With the increase in awareness about the ill effects of chemical drugs on human health, the company has started using herbal medicines.”

“The egg powder unit provides instructions on the use of drugs and antibiotics in birds to farm owners. The poultry farmer has to follow the protocol for use of drugs, growth promoters and other medicine and inform the concerned supervisor about the use of such drugs in case of diseases in birds. Layer birds are not administered any growth promoters and antibiotics. In disease situations, the withdrawal period is followed strictly; until the withdrawal period is over, eggs are sold in the local market and not allowed to enter the processing chain for egg powder. The eggs are sold directly by SKM and no outside, un-contracted vehicle is allowed to enter the farm premises. Only when the antibiotic residues in eggs go below the permissible residue limits, eggs are taken inside the factory.”

“Records maintained include medicines used shed-wise, daily production, feed consumption, mortality and bird count. Data on average production per shed and average production of the farm are analysed.”

“Whenever the processor asks for records of medicines/vaccination they are prepared and sent to the processor; but it is not mandatory or regular.”

Most farms supplying to egg powder plants have basic facilities to conduct laboratory testing. Some of the export units have deputed their own person to make periodic checks whether SOP practices are being followed. Other farms hire services of reputed consultants in the market. They also try to refer to various manuals and SOPs. Overall, there is a willingness to follow Good Agriculture Practices (GAP), provided the higher margin on sale of eggs is maintained.

“A laboratory is present on the farm mainly for testing the nutritional values in the feed and for testing microbial count; some other tests are also done to check residues and toxins.”

“So far, Salmonella and E. coli tests are not done but there are plans to set up a lab which will be ready in six to eight months.”

“The lab attendant reported that they do testing for E coli, of different samples (such as water, feed and excreta) once a month. If the bacterial count is high, control measures are adopted.”

“The owner is in constant contact with professors from the Veterinary College and improves sanitation and hygiene measures on his farm as per their suggestions. He has started using chemical substances like per acetic acid, acidified sodium chloride, etc., for basic sanitary operations, as these chemicals do not leave any residue after use.”

Having to comply to a set of regulations that can be rather daunting for companies, egg powder units and layer farms turn to veterinary universities and consultants for advice on properly running egg processing units and poultry farms. Appendix 6 shows an example on the type of advice provided in such cases.

Going beyond food safety to environmental concerns, by-products such as slaughter waste, hatchery waste, poultry droppings and litter manure can pose serious threat to the environmental safety of the region. It may lead to contamination of groundwater, with serious long-term implications. In India the excreta of birds, whether in cages or through deep-litter, generally is appreciated as fertilizer by crop farmers and as of today there is no problem with excreta waste disposal (Mehta, et al., 2002).

“There is a foot bath at the entrance of the brooder shed; everybody entering the shed has to pass through it.”

“Awareness of farmers needs to improve on aspects related to bio-security.”

“Only once, when a buyer from Japan visited the farm, did they follow the bio-security norms, only for one day; after that they find it difficult to adhere to such norms because neighbouring farms do not. Bio-security norms should be adopted by all poultry farmers in one area.”

“The chick shed and grower shed were side by side. The feed mill was located outside the farms across the road. There is a separate post-mortem room and a special dead bird composting pit at the corner of the farm. Manure from the shed is used for composting the dead birds, recycling the composted material for agricultural operations.”

5.1.3 Challenges in compliance to international standards

Egg powder processing units in India are already HACCP compliant. Most farms are aware of international standards as followed by the EU and the USA. As and when demands for bio-security and animal welfare come from buyers, they are ready to comply. The frequent changes in food safety standards in India’s destination markets, particularly the EU has led to many difficulties for Indian processors, leading to closure of a number of egg powder processing units.

Indian value chain actors feel that following good practices is quite expensive and hence needs to be compensated with higher margins, which they generally do receive from the three registered exporting units. Specific challenges communicated include:

In the past, an Indian consignment of egg powder was rejected. Later it was found that the consignment met all criteria, except an additional standard on MRPL (Minimum Required Performance Limit) that was issued only two to three weeks back (Mehta, et al., 2002).

- Typically, adherence to bio-security aspects is quite difficult. Usually, poultry farms are located in a cluster. To be effective, all farms in the neighbouring area need to follow similar levels of bio-security. The overall bio-security scenario in the area actually has more impact than specific practices by those farms supplying eggs to egg powder units.
- Standards for quality of egg powder vary across importing countries and across buyers (importing companies’ specifications may vary from national standards). Usually, compliance guidelines and norms are not available as a single document. It is difficult to search different documents to arrive at standards that may apply for a specific importing country. Often, standards announced are generic to food, without specific reference to egg powder. Hence, it is difficult to comply with all guidelines and norms.
- At times, there are no well-defined testing standards. The methodology and equipment used by importers are usually confidential and the exporter has access to test results only, not to the process of testing. Detection of one compound in a food product often leads to subjecting all products in a wide spectrum of food products to such tests. As the tests are quite costly, they reduce margins and make the product uncompetitive. Overall, quality testing machines are expensive, demanding huge investments on the part of the exporting units.
- Test certificates issued by Indian laboratories are not accepted by the EU or other developed countries as these laboratories are not accredited to laboratories in the developed countries.

5.2 Animal Welfare in the Poultry Industry in India

Table 7 summarizes the findings of this survey around animal welfare. Framing the practices in terms of the “five freedoms”, it is clear that the focus of farm practices is on health care issues. Commercial poultry farmers in India generally seem to be aware of the need to safeguard the health of their birds. A number of hatcheries provide animal health services to farmers. Veterinary products and diagnostic facilities are readily available to most farmers. Large farmers/integrators employ their own veterinary consultants.

While the three licensed companies follow standards required for export, they do not match the current and best practices applicable in the EU and the Netherlands. As good animal husbandry practices are not required by law when it comes to export to the EU, exporters are not experiencing legal difficulties around animal welfare. However, they realize that such GAPs increasingly will be demanded by their EU

buyers.

Cages used generally are (modelled after) American cages, that provide anywhere between between 340 and 435 cm² per bird (54 and 68 sq inch). However, when an extra bird is put into a cage designed for 4 birds, this may drop below 45 sq inch / 290 cm², with feather picking as a result.

"In the layer shed, 4-5 birds were kept in each cage. In the 31st week shed, there was not much damage to feathers, but in the old layer birds section (65th week), the majority of the birds had damaged feathers and almost naked necks; there were lots of houseflies and also a crow inside the layer shed; as well as a smell was there. The birds had diarrhoea as they could not digest the feed and were ready for culling."

Regarding attitudes on animal welfare, farmers and other chain actors usually do not go beyond the thinking that "animals that produce well, are healthy and feel well; if we focus on high production, welfare automatically will be fine as well". Hence, focus is on healthy, quiet, calm flocks, where necessary achieved with the aid of stress busters, growth promoters and pro-biotics. Awareness on the rights of animal to express natural behaviour seems to be lacking altogether.

"The farm owner is aware of the standards followed in the EU; standards comparable to those in the USA are maintained on the farm."

"After the 70th week, birds are culled and sold to traders who sell the birds. Traders do not go by any animal welfare standards and follow their own practices. The only thing they follow is that the vehicle is washed before entering the farm."

"De-toeing is done on the 2nd day; first beak trimming is done on the 12th day and 2nd beak trimming on the 14th week using a hot-blade. This work is outsourced to professionals from Mysore."

"Beak trimming is done on the 11th day and also in the 14th week, based on beak growth. This is not done by the farm workers; it is outsourced to a team that performs this service for other farms in the area. The machine used is a 'Lion de-beaker', made in the USA."

Although it may appear that many of the industries are prepared to change (following consumer demand), presently only one company in India actively brands their eggs as "Food safe and Cage free" (see box 3).

It is quite clear that there are many perceptions and positions about good agricultural practices, food safety and animal welfare. Arriving at the correct balance is the challenge.

Table 7 Animal welfare KAP in egg production for egg powder export

STRENGTHS	WEAKNESSES
Freedom from hunger & thirst	
<ul style="list-style-type: none"> - Ad lib feeding and watering of high quality feed & water 	<ul style="list-style-type: none"> - "5th hen in 4-hen cage" limits access to feed and water (3.6"/ 9 cm feeder) - Single drinkers in some farms denies water in case of clogging
Freedom from discomfort	
<ul style="list-style-type: none"> - Well-ventilated and shaded houses with daylight and heating/cooling when needed - Back-up generators generally present 	<ul style="list-style-type: none"> - Cage size generally up to US standards only (...), but farmer may overstock - Lighting for longer photo-periods (16 hrs) practiced in many farms
Freedom from pain, injury and disease	
<ul style="list-style-type: none"> - Beak trimming carried out by professionals - Generally strict supervision of practices - Most farms are using rather comprehensive SOPs for bio-security, leading to low disease pressures - Limited mutilation noticed - Moulting not generally practiced - Good level of veterinary services and advice - Farmers well aware of importance of 'healthy flock' 	<ul style="list-style-type: none"> - Compliance to bio-security measures lagging in number of cases observed - Beak trimming before 12 days and sometimes repeated at 14 weeks, manually or mechanically - De-toeing practiced in some instances - Older birds often have naked necks - Unprofessional transport practices on-farm and after-farm (injuries, heat stress)

Freedom from to express natural behaviour

- Cages do not allow for natural behaviour; no resting area, no solid floor, no nesting area

Freedom from fear and distress

- Most farmers successfully create a calm and controlled environment, free of predators
- In a number of instances, use of stress busters is needed to keep birds quiet
- In number of farms, crows and rats access chicken houses
- Large number of birds per house enlarges disturbances
- As caretakers do not tend to talk to birds, birds are frightened by interaction with humans

Box 3 – Kegg Farms – a special case?

Kegg Farms, a North India based company with farms in Bangalore in South India, markets KEGGS, a brand of premium quality, wholesome & fresh, range quality, cage free, tan eggs¹. They claim their market consists of discerning and quality conscious consumers. Kegg Farms claims that their eggs are distinguished by their tan coloured shells, bright yellowish orange yolk and firm albumen, and are produced by disease free, specially bred laying hens in the company's hygienic farm facilities. The layer birds are kept in deep litter housing with adequate room to run around, have ready access to feed and water, perches to roost upon, and protection against diseases and threats of both natural elements and predators.

The company claims the birds have access to plentiful sunshine and are fed a nutritionally-rich and balanced diet of maize, rice derivatives, soya, sunflower, limestone, vitamins and other organic plant products together with ample greens. Kegg also claims the feed contains no antibiotics, hormones, chemical stimulants or any other ingredient that may have a carryover effect on the consumer.

Regarding freshness, the company claims that KEGGS are delivered fresh from the farm to retail outlets and that there is no deterioration in quality due to transit time or long storage. They further claim KEGGS compare very favourably with the highest quality table eggs available anywhere in the world.

The research team visited the KEGG farm unit in Bangalore where the birds indeed were maintained in cage free conditions. However, Kegg Farms, although well written about, runs true to type of the poultry sector in India by not encouraging further visits or interaction. Kegg Farms does not make egg powder.

6 Conclusions & recommendations

6.1 Conclusions

6.1.1 The egg powder value chain

Although India has a vibrant poultry industry, egg powder seems to be an extremely specialized product. Very few companies make the grade for meeting international standards applied by EU and Japan. At present only three companies are licensed by the EIC for export to the EU. Egg powder is manufactured specifically for export. While differences exist in quality demands between the different export destinations in Europe and Asia, egg powder as a product has no market in India. Domestic demand for the product is limited to some use by the army through a designated company. Egg powder exports to the Gulf and the USA by a few other companies has not been included in this report.

There is much similarity across the three licensed egg powder manufacturing and exporting units with regards to the organization of the egg powder value chain and with regards to the adoption of Good Agriculture Practices (GAP): Export Units prefer to purchase eggs from exclusive poultry farms. They prescribe these farms to adhere to SOPs, implementation of which is monitored through farm supervisors appointed by the Export Unit. Production inputs meet minimum quality standards. Much attention is given to bio-security. Laboratory facilities are used to monitor absence of pesticide residues in feeds, antibiotics traces and disease infections in eggs. Egg powder units are HACCP compliant.

As the investments are high, most of the farms maintain optimum standards for production. Annual egg production figures of over 310 eggs are not exceptional. Lowering standards would result in lower production, which would result in loss of profit for the poultry farmer.

6.1.2 Good Agricultural Practices around food safety and animal welfare

Farms use a uniform housing system: USA-size multilevel cages in elevated wire-mesh-walled barns housing around 22,000 birds. Manure is collected in pits under the barn and sold to crop farmers. Climate control is adequate, through ventilation, fogging and heating. Birds have free access to feed and water of good quality. Some farms create photo-periods of up to 16 hours. Beak trimming is practiced before the chicks are 12 days old, sometimes repeated at 14 weeks. Some farms practice de-toeing. There is no forced moulting. A number of operations, such as collection of eggs, movement of birds, cleaning of sheds, sorting the eggs, etc, are done manually. Women are preferred in many farms as they are supposed to be gentler while handling birds as well as more conscientious about maintaining standards. They are also paid lower wage rates.

From a five freedoms perspective, animal welfare can be evaluated as follows:

Freedom ...	Score
from Hunger and Thirst	+
from Discomfort	-
from Pain, Injury or Disease	+
to Express Normal Behaviour	-
from Fear and Distress	+/-

Culled and old birds are sold in the open market for slaughter. Transportation methods vary wildly. As many parts of India still require *halal* meat and most butchers belong to the Muslim community, the method of slaughter is usually *halal*. Diseased birds are treated outside their cage and birds that die are buried and composted.

Awareness on the need for bio-security is well developed among egg powder value chain actors. On-farm bio-security is usually well-maintained according to SOPs. As other poultry and livestock ventures apply lower bio-security levels, farms producing for egg powder plants are forced to choose their locations carefully, not to be subject to contamination from neighbouring farms through air-borne infections.

Currently, GAP standards primarily relate to adherence to food safety standards of importing countries.

Although animal welfare has not been a major concern in egg powder export trade, export units are quite aware of it through discussion with their EU customers. They are interested to know what exactly they can expect in terms of additional requirements, as to adjust their production processes.

Eggs rejected for conversion to egg powder enter the Indian market, where consumers are not critical about quality issues like residues and disease risks.

In general, it was observed that farms supplying eggs for conversion to egg powder maintained higher standards of food safety, animal welfare, and management than farms producing eggs for local consumption. SKM and Venkateshwara also have their own farms which supply eggs especially for conversion of eggs to egg powder.

Egg powder manufacturing units that export to the EU almost uniformly have state-of-the-art facilities. They have laboratories for testing egg powder, eggs, feed, water quality, bird faeces, blood, etc. SKM is the best-equipped and most modern.

In assuring product quality in the value chain, actors face the following issues:

- **Pesticide residues** - A major concern in India has been the presence of pesticide residues in feeds, which can leave traces in the eggs. The major feed ingredients are maize, soya and groundnut cake. While maize for poultry is grown primarily in irrigated areas, soya and groundnut are from drier regions. The country's green revolution policy and subsidies for fertilisers and pesticides often work against the target of achieving pesticide-free food. Most farms linked to egg powder units procure feed from specific areas which are known to have pesticide residue levels within the minimum permissible limits. As even a very small amount of pesticide residues in eggs can result in rejection of an entire consignment of egg powder, the industry is extremely careful and has testing laboratories within their premises. They prefer linking with farmers who procure feed from a known source and also have their own feed mill.
- **GMOs** - The EU's stand on Genetically Modified Organisms remains confusing to outsiders. While the EU does not allow the growing of GM crops in its member countries, there has been no ban on importing egg powder from countries where poultry are fed on GM maize. As yet, maize and soya in India are not genetically modified, but the country is not banning import of GMO seed either. There is a fairly strong anti-GMO lobby in India that would like to see no GMOs entering the country at all, especially when it comes to edible crops. This offers opportunities for joint positions.
- **Antibiotic residues** - Antibiotic residues are another factor of concern in India due to the tropical environment. Most farms give anti-coccidials (like Nitrofurazone), anti-mycoplasmal drugs (such as Tylosin) up to eight weeks of age of birds. As yet, there is no legal provision in India regarding the withdrawal of antibiotics; hence, many antibiotics continue to be in use and eggs are sold without waiting for the stipulated withdrawal period. The farms producing for egg powder units form a positive exception. There already is a move by the industry to adopt accepted pro-biotics as well as validated herbal and *ayurvedic* medicines. Increased surveillance and monitoring of major poultry diseases are needed to control Salmonella, New Castle Disease and HPAI.

Some research has been going on in veterinary universities on the use of suitable alternatives, including validated ethno-veterinary treatments. Most veterinary universities have close linkages with the poultry industry in their area. Tamil Nadu University has extremely close links with poultry farmers of the Namakkal region, the so called poultry hub of the country.

6.1.3 Regulatory framework and compliance

EIC certifies companies for a.o. egg powder for export. Several other legal provisions are in place regarding food safety, which egg powder manufacturing and exporting units have to comply with. These come under different Ministries, which makes it hard for single actors to understand the whole scene. Moreover, companies also independently follow international regulations such as CAC, as well as the special requirements of the nation or customer to which they need to export. This can get complicated as different countries set different standards.

The egg powder units have defined their own SOPs with respect to poultry housing, care and management, including feeding and watering. As these SOPs are up to EU standards for imported

goods, companies can ensure production of dependable and quality egg powder that meets the requirements of customers and authorities. Farms supplying eggs to these industries are integrated and, therefore, have to adhere to these protocols for fear of losing their market. Regular supervision by the industry ensures that the farmers maintain these standards.

While exporting units maintain standards so as to get certification from the EIC, smaller units which do not export may not feel it is worthwhile to maintain standards, as their products do not command a high enough price in the local market to warrant the extra investment.

6.1.4 Views on food safety and animal welfare

Knowledge, Attitudes and Perceptions (KAP) on Good Agricultural Practices in the egg powder chain vary considerably, depending on the profile of the person.

- Industry:** There is an overall willingness amongst export units and associated poultry farms to adhere to international standards and norms. However, there is a major concern that these guidelines are rather fluctuating and at times generic in nature. Players in the egg powder export value chain need to be able to relate costs incurred in adopting the GAP to additional margins obtained. As some of the testing facilities are quite expensive, there also is a call for investment support by the Indian Government. At international level, there is a need for standardization of GAP linked to different market segments, as guidelines for GAP vary according to the purchasing power of the importing country.

The top management of involved companies is aware of the best practices and international standards, but is constrained by country conditions. For example, the issue of pesticide residues is well known to the industry. As the agricultural policy of India does not ban pesticides, it is difficult to obtain pesticide-free maize. The industry is lobbying for change on this issue.

Other issues are at stake as well. The industry would like prime irrigated agricultural land to be diverted to maize cultivation to keep maize prices down. Other farming communities and groups that are more concerned about issues of food security are unwilling to concede such demands.
- Farmers:** Large poultry farmers try to follow the recommendations of top companies and the universities to enable export of their product. Many are willing to improve standards as dictated by the market. They are aware of animal welfare standards and even mentioned that conditions in large Indian poultry farms were better than standards prevailing in the USA. However, it is expensive to ensure high bio-security and animal welfare standards. Farmers will only adapt as much as the market can bear. As many farms are situated in 'poultry belts' and not all are large enough to maintain high standards of bio-security, maintaining bio-security can be a problem as farms can not be sealed off completely. This was one of the reasons for farms producing eggs for egg powder export not to permit visitors. In the poultry scene at large, small and medium-sized poultry farmers and butchers are not well informed about food safety and animal welfare aspects, especially when it comes to international regulations.
- Professors and Government Institutes:** Scientists are aware of international standards and EU regulations and are, therefore, regularly consulted by farmers and industry. However, not all EU regulations are transparent. Interpretations may vary.
- Government of India:** At Central Government level, key government departments like APEDA, EIC, and MoFPI are naturally well aware of the issues related to animal welfare, food safety and trade. To encourage exports, the government has been loath to include welfare issues in trade talks. They have also felt that the stringent standards maintained by the EU are a barrier for export.
- Indian consumers:** The average Indian consumer is not aware of either production methods or farming methods employed in the poultry sector. This results in a divergence between industry KAP and general public KAP. As yet, there is no premium in India for eggs from farms with higher food safety or animal welfare standards. Only one company in the country (Kegg farms) sells premium quality eggs raised in cage-free housing. Because average Indian consumers are not well informed and organized, they do not constitute an influential pressure group. Pressure has so far come either because exports have been rejected or from animal welfare activist groups within the country, like CUPA and HSI.

6.1.5 Strengthening GAP in the egg powder export value chain

In conclusion, the major areas of shared concern are:

- i. The continued use of antibiotics in the poultry sector for non-therapeutic purposes and the fact that India has no policy on withdrawal period of antibiotic treated products before releasing them in the market.
- ii. Ensuring access to pesticide residue-free feed for acceptable prices.
- iii. Issues of animal welfare and the fact that, at present, the eggs used for egg powder are produced under the caged system; the industry, especially the top companies, are aware of the standards set by the EU and are willing to change to adapt to international standards, provided it is economically viable.

6.2 Recommendations

These recommendations include issues identified from this study. Some of them were formulated during the stakeholder workshop that came together to discuss Good Agricultural Practices and ways forward. The discussions at this workshop showed a window of opportunity for future involvement on food safety and animal welfare issues (see appendix 1).

6.2.1 Issues and approaches

On the use of antibiotics

- More research on the use of ethno-veterinary drugs, pro-biotics and *Ayurvedic* medicines in the commercial poultry sector is required, as well as increased surveillance and testing, especially for diseases like HPAI and salmonella infection (see more in 6.2.2.).
- Policies on use of antibiotics and withdrawal periods need improvement and enforcement.

On pesticide residues

- More stringent action on the use of pesticides and a definite programme to withdraw pesticides as well as disincentives to companies selling pesticide in the country has to be followed.

On animal welfare

- The commercial relationship between Western buyers and Indian suppliers of egg powder seems the best avenue to improve welfare in the egg powder sector and beyond. The poultry sector is willing to adopt higher animal welfare standards as long as farmers and processors receive a commensurate price. The question remains though is how, once export units have high standards, smaller units for local produce or for export to countries that are not critical of standards, could be convinced to keep birds in better conditions.
- While market mechanisms for improvement of animal welfare could well work for export oriented livestock production like egg powder, improvement in animal welfare in India at a larger scale would require political support to implement a wider set of interventions.
- As the Animal Welfare Board of India really does not have industrialized poultry as a priority area, monitoring whether minimum standards are maintained may be an issue. Something like a special cell on Animal welfare in industrialized farming systems may be set up, or this may be tied to the food safety monitoring work of the EIC.
- Potential options for policy development include minimum standards for all commercial farmers, animal welfare-linked labelling and market development, or incentives for animal welfare-linked production systems. The required clarity on an animal-based welfare monitoring system that may lead to policy support is yet to evolve.
- Specific changes in the curriculum for veterinary students need to be made to ensure that they receive sufficient training in animal welfare and food safety subjects. The Veterinary Council of India, along with different veterinary colleges should design and initiate courses which cover these current and critical topics.
- As the Indian consumer is quite unaware of the way livestock products are produced, campaigns could be initiated amongst Indian consumers on both food safety and animal welfare issues. Specific target could be the urban elite, as they are the largest in-country consumers of industrial poultry products. Campaigns in urban schools, supermarkets etc may serve this purpose of educating the public and create mass awareness on animal welfare (through literature, books, seminars; inclusion of the subject of animal welfare in school textbooks; and sensitising people to be compassionate and caring towards animals by recognising that they are living beings capable of feeling pain and suffering).
- To effectively address livestock welfare in general, activities need to be undertaken in collaboration with veterinary health services activities. There is a need to design better transportation and handling of animals methods; ensuring implementation of animal welfare laws at the slaughter houses. Inspiration may be drawn from the UNICEF campaign on HPAI.

6.2.2 Recommendations for specific actors

Industry - The industry has its own set of responsibilities. It is suggested that:

- The industry sets the standards and act as trend setters in food safety and animal welfare standards, for farmers to follow by evolving best practices and protocols.
- Large industry-players should have an animal welfare ethics committee with representation from the industry, the Veterinary Council of India, civil society and animal welfare groups. The ethics committee could develop and guide the sector on key elements of animal welfare.
- The Industry could make a phased, market-demand-based transition to more humane practices. Certification of products as “humane certified” could be brought in through third-party auditors. Companies should implement and maintain high standards for export as well as for the domestic market.

Farmers

- Farmers need to accept changes at various levels and work towards implementing them. If farmers want to tie up to the export market, they will have to follow bio-safety measures as advised by experts and strictly follow these protocols.
- Feed ingredients need to be tested at farm level to ensure that end products, like egg and egg powder, do not get contaminated with residues present in feed.

The European Union and its member states

- The EU should deal with the impression it creates that it keeps raising standards for imports just to blocks imports in order to protect its home industry. This is a challenge, as maintaining separate standards on animal welfare for domestic production and for import can be equated to “outsourcing cruelty”.
- Similarly, clarification and resolve of the dual standards on food safety with respect to GMOs should be addressed.

Indian Government

- Government intervention is urgently required to ban pesticides that have already been withdrawn in other countries, the establishment of multiple labs for testing and diagnosis of critical poultry diseases.
- It is strongly recommended that the government develop a policy for antibiotic withdrawal and implement it by establishing strict controls, monitoring protocols and certification procedures for farmers and industries and by setting up proper inspection systems.
- It is suggested that the government provide incentives and subsidies to enhance good agricultural practices, have implementable legislation on cruelty to farm animals and give tax rebates to humanely-produced animal products.
- The government could play an active role in the education of farmers, especially maize-growers, on post-harvest and storage techniques to increase output. Farmers also need to be made aware of the problems that would arise when using banned pesticides.
- Reducing the import duty on yeast, DDGS (distillery-dried grains with solubles) and corn/maize will counter rising feed prices. While the industry would be more than happy to have more land diverted to growing critical feed ingredients, in a country like India that would be unfair to the millions who do not have food security.

Research and development by Veterinary Universities & Research Institutions

- It is suggested that these institutions take up research on appropriate and applicable traditional knowledge on herbal medicines, high-yielding varieties of poultry feed ingredients, especially maize, modern poultry products, and diagnostic kits for the farm level at affordable prices. Students at the Master’s level could take up some of these issues for study perhaps as pilot projects and the findings could then be disseminated to farmers as well as the industry. NGO’s and veterinary Universities had a critical role to play in the education and training of farmers such as running training programmes for farmers on animal welfare and good agricultural practices.

AWBI

- Increased and effective implementation of the Act and the Rules pertaining to animal welfare requires strengthening and expansion of the Animal Welfare Board of India. Linkages should be established with the institutions of Animal Husbandry and Veterinary Departments, to avoid creation of an additional set of infrastructure.

Indian NGOs and Animal Welfare Groups

- Next to creation of greater awareness on welfare issues (such as cruelty endured by birds produced industrially), practical measures for improved animal welfare need to be suggested that would keep poultry farming viable and at the same time do not result in the spread of zoonoses.
- Animal welfare groups and NGO's are requested to work in tandem with industry and government, and play a positive role in acting as a bridge between farmers and Government. It is suggested that they continue to lobby with the EIC/EIAs and other trade departments to ensure that animal welfare is included in an appropriate way as a non-trade issue in negotiations for a Free Trade Agreement.

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Appendices

Appendix 1 – Workshop Session IV - The Way Forward

[Session IV from “Good Agricultural Practices in the Indian Layer Industry; Opportunities and Challenges for Egg Powder Export”, Proceedings of workshop, 20th and 21st January 2010, Hotel Sun and Sand, 262, Bund Garden Road, Pune 411001, India, Dr. Nitya S. Ghotge and Dr. Gayatri R. Rajurkar (editors)]

The major issues of concern which emerged from the workshop were:

- Continued use of antibiotics in the poultry sector for non-therapeutic purposes and the fact that India has no policy on withdrawal period for antibiotic treated products before releasing them in the market.
- Issues of animal welfare and the fact that, at present, the eggs used for egg powder are produced under the caged system.
- High feed costs and the presence of pesticides in the feed.

The group was asked to provide suggestions to address these issues. Among the major recommendations listed by the group were:

General recommendations

Use of Antibiotics

- Use of ethno-veterinary drugs, pro-biotics and Ayurvedic medicines.
- Increased surveillance and testing, especially for diseases like Avian Flu and bacterial infection from salmonella, as well as vaccines for these.
- Vaccines to be developed as per EU norms especially for exporting poultry units.

Animal Welfare

- Over time, it will be possible to implement animal welfare measures, provided such products get a premium price.
- Many actions promoting animal welfare exist that are good for business and can be carried out in a cost-effectiveness way.

Feed

- On the issue of high feed prices and the presence of pesticides in the feed, the participants felt that government intervention was required, especially to ban pesticides that have already been banned in other countries.
- It was also recommended that the government should play an active role in the education of maize-growers on post-harvest and storage techniques. Farmers would also need to be made aware of the problems that would arise if they use banned pesticides.

The group came up with recommendations for enhancing good agricultural practices for food safety and animal welfare: These recommendations were directed to the industry, the government, universities & research institutes, poultry farmers, NGOs as well as to the European Union:

Recommendations for the Industry

- Adopt bio-security norms.
- Include animal welfare as a guiding principle for trade, extend expertise to poultry farmers and support them in the implementation of such measures.
- For export items, follow the most stringent EU standards for food safety and animal welfare.
- Industry should take a lead in animal welfare and lead by demonstration to small farmers.
- Implement and maintain high standards for export as well as for the domestic market.
- Industry must evolve and document best practices for animal handling and other welfare measures; Inspection and audit of these should be driven by the industry and punitive action to be taken against those who do not comply.
- Large industry-players should have an animal welfare ethics committee which has representation from industry, the Veterinary Council of India, civil society and animal welfare groups; The ethics committee could develop and guide the sector on the key elements of animal welfare.
- Industry could make a phased, market-demand-based transition to more humane practices; certification of products as 'humane certified' could be brought in through third-party auditors.

Recommendations for Universities & Research Institutes

- To take up research on existing field problems and develop appropriate solutions that are also profitable; The findings should be disseminated widely. Students at the Master's level can take up some of these issues for study.

- Encourage research on appropriate and applicable traditional knowledge (herbal medicines) which can then be disseminated to farmers.
- Develop new high-yielding varieties of poultry feed ingredients, especially maize.
- Develop farm-level diagnostic kits at affordable prices.
- Review farm designs / husbandry systems; consider whether non-cage systems should be introduced to adjust to changing demands and enhance India's advantages.
- Universities and national institutes should be provided with a 'project bank' for development of modern poultry products.
- Piloting projects at different locations to demonstrate the technical and financial viability of implementing GAP (Good Agricultural Practices) and Animal welfare measures.
- Extend expertise to industry as well as small farmers.
- Provide continued education and training of farmers and college teachers.
- Animal welfare should become part of the veterinary education curriculum and veterinary students should regard animal welfare as an integral part of animal husbandry.
- The focus of veterinary education should not just be to increase production; institutes should take up research on the stress caused by intensive farming.
- Run courses on animal welfare and good agricultural practices for farmers.
- Develop a strong interface between the industry and universities, like in Tamil Nadu.

Recommendation for the Government

- Establishment of multiple labs for testing and diagnosis of critical poultry diseases.
- Provision of cold storage facilities for eggs used for conversion to egg powder.
- Establish strict controls, monitoring protocols and certification procedures for farms and industries in a streamlined manner.
- Provide incentives and subsidies to enhance Good Agricultural Practices.
- Reduce import duty on yeast, DDGS (distillery-dried grains with solubles) and corn/maize.
- Develop implementable legislation on cruelty to farm animals.
- Set up proper inspection systems.
- Provide tax rebates to humanely-produced animal products.

Recommendations for the European Union

- Should not unfairly block imports only to protect home industry.
- Should not have dual standards of animal welfare with respect to domestic farms & import; They should not "outsource" cruelty.

Recommendations for NGOs and Animal Welfare Groups

- Suggest practical measures of animal welfare that keep poultry farming viable; Care should be taken that these measures do not result in the spread of zoonoses.
- Work in tandem with industry and government.
- Generate greater awareness about welfare issues, especially on cruelty endured by birds produced industrially.
- Lobby with the export inspection agencies/other trade ministries to ensure that animal welfare is included in Free Trade Agreement as a trade barrier.
- Play a positive role in acting as a bridge between farmers and government.

Recommendations for Farmers

- Need to accept changes at various levels and work towards implementing them.
- Feed ingredients need to be tested at farm level by farmers, to ensure that end products, like egg and egg powder, do not get contaminated because of residues present in feed.
- Follow bio-safety measures as advised by the Department of Animal Husbandry and medicate birds as per the recommended schedule.

Overall, it was agreed that:

- Many seminars have been held but none on egg powder.
- This seminar brought together the poultry industry, animal welfare activists, government officials, universities & research institutes to discuss and debate issues concerning the sector.
- Several small industrialists in India would like to take up production of egg powder; The learnings from this seminar should be treated as recommendations by the stakeholders in the sector.
- Small initiatives in animal health & welfare could lead to positive changes for the industry, if they are perceived to enhance profitability.
- Happy hens lead to happy farmers.

Appendix 2: List of egg powder manufacturing and exporting units

Name of the Firm	Type	Address	Location of Egg Powder Manufacturing Facility	Products	Company Details	Current Status
Ovobel Foods Ltd	Manufacturer Exporter	984, 1st Cross, 12th Main, HAL - II Stage, Indranagar, Bengaluru, Karnataka , India 560008, Tel: 080-25263735/ 25294319; Fax: 080-25260618; Email: ovobelfoods@vsnl.com Web: www.ovobelfoods.com	No. 30, KIADB Industrial Area, Malur, Kolar District (Karnataka) 563130	Pasteurised spray-dried hen whole-egg powder, hen egg-yolk powder, pasteurised egg-albumen powder, whole-egg frozen pulp, frozen egg-yolk pulp	Ovobel was started in collaboration with Ovobel NV Belgium	Currently functional
SKM Egg Products Export (India) Ltd	Manufacturer Exporter	156, Gandhiji Road, Erode, Tamil Nadu, India Ph: 0424-2351532 to 34, Fax: 91-424-2351531, Email: operations@skmegg.com	20th Km, Erode-Karur Road, Punjai, Kilambadi Village, Cholangalayam Erode-638 154, Tamil Nadu India.	Egg-yolk powder / standard / high-colour / heat-stable / pasteurised spray-dried; pasteurised spray-dried hen whole-egg powder, spray-dried hen egg-albumen powder, Pasteurised spray-dried blended hen egg-powder, preparations with milk derivatives, salt, sugar, etc., as ingredients	Joint venture between SKM Animal Feeds and Foods (India Limited) and Tamil Nadu Industrial Development Corporation Limited (TIDCO)	Currently functional
Venkateshwara Hatcheries Ltd	Manufacturer Exporter	Venkateshwara House 114/A/2, Pune-Sinhagad Road, Pune-411030 Tel: 24251530 Email: vjvr@vsnl.net	Village-Veljerla 1, Farooq Nagar Mandal, PB No.2, Shadnagar, Mahboob Nagar Dist 509216, India. Ph: 08548-22885, Fax: 08548-252884 E-mail: mbn_vhplepp@sancharnet.in	Pasteurised spray-dried hen whole-egg powder, pasteurised spray-dried hen egg-yolk powder and de-sugared spray-dried hen egg-albumen powder, heat-stable egg-yolk powder		Currently functional
AG Foods Limited	Manufacturer Exporter	Village Mangli Uchi, CHD Road, Ludhiana, Punjab 141008, India Phone: +(91)-(172)-2021077 Fax: +(91)-(172)-5018468 Mobile: +(91) 9216711077	Ludhiana (Punjab)	Whole egg powder, egg yolk powder, albumen powder	AG Foods Limited is a joint venture with PAIC (a Punjab Government undertaking) and has a technical collaboration with FES International	The unit was closed a few years ago and is now being revived
Safa Agro-Products Pvt Ltd	Manufacturer / Exporter	403, IV Floor, Crescent Towers, Masab Tank, Hyderabad - 500 028, A.P.- India	Manufacturer/ Exporter	Whole Egg Powder, Egg Yolk Powder, Albumen Powder, Pasteurized Frozen Whole Egg, yolk and albumen	Not clear from the website www.safaagro.com , claims to be manufacturer and exporter	Indian Subcontinent, East Asia, Middle East and South East Asia

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DRDO - Ministry of Defence	Manufacturer - Pilot Plant	Defence Research and Development Organization, Ministry of Defence, Government of India	The Defence Food Research Laboratory (DFRL), CFTRI campus, Mysore, Karnataka	Omelette and scrambled egg-mix powder	In technical collaboration with CFTRI	Functional only to cater to country defence needs for egg powder
Indian Ovo Agro Foods Pvt Ltd	Distributor/Wholesaler/Exporter	UGF - 37, World Trade Centre, Babar Road, CP, New Delhi 110001 Tel: 011-23411444	Distributor/ Wholesaler	Egg powder of different categories	Website no more exists (May 2010), it was working when the study started	Belgium, Asia
Burhan Exports	Exporter - Trading Company	702, Sohan Towers, Pokharan Road No 1, Opp Shiv Sena Bhavan, Khopat, Thane MH	Only a trader in egg powder export	Whole and white-egg powder	Not Clear	Web search claims they export eggs to USA and the EU
Bharathi Traders	Exporter	RNR Towers, 59, Kovai Road, Karur, Tamil Nadu, 639002 India; Phone: +(91)-(4324)-231424 Fax: +(91)-(4324)-231424, Mobile: 9443169424	Trading company in egg powder	Albumen powder, yolk powder, whole-egg powder	Not clear	Trading to Jordan, USA
AG International	Exporter / Dealer	2222, Sector 21- C, Chandigarh, Tel: 0172 - 720181	Only a trader in egg powder			Exporter for AG Foods, currently not functional
Apollo Trading Corporation	Exporter	14, Mangala Park, Nahur Road, Mulund West, Mumbai 400080 Maharashtra India, Tel No: 022 25682834	Only a trader in poultry products, not in egg powder	Not clear	Agro-marine company	Export poultry products to Gulf countries
Al Fahad Omega Egg Products Ltd	Not Clear	55-56 Bombay Bazar, II Floor, Meena Bazar Complex, Indore, Madhya Pradesh, India	Trading of egg powder and other Poultry products	Egg powder	-	Middle East
Indo Dutch Proteins Ltd	Not Clear	8-3-324 Krishna Apartment, Yella Reddy Guda Hyderabad, Andhra Pradesh, India	502, Vamsee Estate, Ameerpet, Hyderabad, Andhra Pradesh, India	Egg powder	Previously exporting egg powder to EU countries, Middle East, South East Asoa, and others	Not functional currently
PRS Technologies Pvt Ltd	Not Clear	Nr. 12, I Ind Main Road, Jayamahal Extension Ground Floor, Bangalore, Karnataka, India	Only a distributor of egg powder in local market	Egg powder	-	Local egg traders
Radhika Trading Corporation	Dealer - Trader	78, No. 4, Veerapandi Pudur, Coimbatore 641019, India Phone: +(91)-(422)-2695315	Trader in meat and poultry food	Not exporting egg powder	-	Local trader
C & M Poultry Services	Exporter	1st B Main, Gangenahalli Extension, Bengaluru, Karnataka, 560032, India - Tel No: 080 - 3433110	Exporter of Feeding systems for layers	Feeding trays, troughs, pipes, feeders	-	-
SSP (Pvt Ltd)	Exporter	SSP(Pvt) Ltd.; 13, Milestone, Mathura Road Faridabad, Haryana	Expert in designing, manufacture, installation & commissioning of egg powder plant			Export machinery to various countries

Appendix 3: Details of Indian Companies Manufacturing and Exporting Egg Powder to the EU

1. SKM Industries

The SKM egg powder unit is at Cholangapalayam (19km from Erode city) in Erode district of Tamil Nadu. SKM Egg Products Export (India) Ltd) is a joint venture company promoted by SKM Animal Feeds and Foods (India Limited) and the Tamil Nadu Industrial Development Corporation Limited (TIDCO). SKM Maeilanandhan is the founder of the Rs. 4 billion SKM Group which is engaged in the manufacture of poultry and animal feeds, contract farming of eggs, farm services and marketing. He developed this 100% EOU (export oriented unit) into an industry. The company has opened branch offices in Japan and the EU. The modern state-of-the-art processing plant uses the best technology and commenced the commercial production in July 1997. The project now employs more than 200 people, can process 1.2 million eggs every day and can produce a range of products such as albumen powder, yolk powder and whole egg powder for the international market. SKM Industries is gearing up for the future with more value-added products.

SKM has a standard protocol for its supplier farms which has to be strictly followed. Farms are monitored on a daily basis by a staff member appointed by SKM. A veterinary doctor appointed by SKM visits all the farms fortnightly to check the health of the birds. Major points in the protocol include:

- Use of antibiotics is prohibited on the farms;
- The entire farm should be fenced to protect the birds from contact with outsiders -- human and animal;
- The bird houses should be cleaned and disinfected as per the prescribed methods before transferring the layers from the brooder house. Also, there are methods for cleaning and disinfecting the brooder house before transferring the brooders from/to the chicks' house;
- The labourers, the staff and all those who visit the houses should wear uniforms provided for the purpose;
- Feed formula should be as per the prescription of SKM;
- The houses should be covered with nets to prevent entry of stray animals, rodents and stray birds;
- Light and temperature inside the houses should be maintained at prescribed levels with the help of shade nets / tarpaulins and foggers;
- The farm should have standby generators for maintaining the temperature and also to provide feed and water as per schedule;
- Farms should have bio-shields to control wind speed and prevent migratory birds;
- In the entire Erode and Namakkal belt, the practice is to collect eggs from the trays every day. Collected eggs from supplier farms of SKM are transported the same evening to the factory by trucks. Egg trays are washed in the factory every day;
- In the event of any bird disease, suppliers are required to inform SKM immediately and as per the company veterinarian's prescription, antibiotics can be administered. Eggs are not sent to the factory for the next 15 days but to the market as per the sales facilitated by SKM. Only when the antibiotic residue in eggs reaches below the permissible limits, eggs are taken to the factory;
- Samples of farm egg are tested daily by SKM.

Table 8 Details of SKM Company Operations

No	Operation	Name of the Supplier / Actor	Specifications/ Details	Standards Followed
1	Hatchery	Many zonal hatcheries, supplying BV 300 or Lohman or Bovans types of chicks		Hatchery standards of respective company
2	Day-old chick transporter	Local, contracted by hatchery	Specialised racks or wooden flanks to keep chick boxes	Hatchery standards for chick boxes, cool hours of placement
3	Farms raising layers	One own and 6 contracted out farms	Own farm capacity – 0.6 million, eggs from other contract farms – 0.6 million	SKM – SOPs
4	Small-scale producers	-		-
5	Medium-scale producers	Three medium-sized producers with joint capacity of 0.2 million eggs per day		Hatchery standards for chicks, SKM SOP for feed, medicine use
6	Large-scale producers	Three large-sized producers with joint capacity of 0.4 million eggs per day		Hatchery standards for chicks, SKM SOP for feed, medicine use
7	Egg transporters	Farm owner contracted transporters	Annual contract of vehicle, disinfection before delivery of each batch of eggs at farm and at unit.	Daily delivery of eggs at unit, trays are given to company and washed daily
8	Egg processor	SKM	Factory near Erode, Tamil Nadu	
10	Exporters (storage and transportation)	SKM	Export from Chennai or Coimbatore airport, consignment of boxes of egg powder transported in trucks to the nearest airport	
11	Transporters (finished layers)	Local traders in respective areas	The finished layers mainly are sold to bulk purchasers	The rate depends on number of hens and not on weight
12	Slaughterhouses / other terminal facilities	Local butchers/ cutters and sale at hotels, send mainly to Kerala and Karnataka		
13	Feed procured from	Own feed mill for all the farms	Specially formulated feed for eggs going to egg powder plant	No non-vegetarian feed ingredients are used
14	Medicine procured from	Various companies specified by SKM		SKM SOP for use of antibiotics
15	Vaccines procured from	Ventri Biologicals, Intervet India, Indobiocare, Indovax, Fortedodges	All companies have distributors in respective areas, so procuring vaccine of choice is easy	SKM SOP and veterinarian's advice
16	Equipments for farm procured from	VG Poultry Equipments, Shree Shanmugaa Poultry Services , Namakkal, Tamil Nadu, Venkateshwara Agencies, Namakkal	Depending upon farm capacity and number of sheds, cage size and length is decided and made specifically	No standard SOP is followed
17	Equipment for egg processing unit	Thailand, Holland, USA		International standards

2. The Venkateshwara Industries

Venkateshwara's egg powder unit is situated at Veljerla, Shadnagar Block, 60 km south of Hyderabad (Andhra Pradesh). The egg powder plant started operating in April 1995. This was the first plant of its kind in India. The company boasts a modern state-of-the-art processing plant. The company received considerable support from the Government. The project now employs more than 300 people, can process 1.8 million eggs every day and produce a range of albumen powder, yolk powder and whole-egg powder for the international market.

Details of Poultry Farms Supplying Eggs to Venkateshwara Egg Powder Unit

The installed capacity of the unit is breaking 1.8 million eggs per day. The company has its own layer farm of 0.6 million birds located in Veljerla village, Shadnagar district of Hyderabad. The company sources eggs from four other farms integrated with this unit. The contracted farms are in the range of 100,000 to 300,000 eggs per day.

Venkateshwara has two standard protocols for production of egg by farms that supply eggs to Venkateshwara's egg powder unit. The first is the chick growing protocol that the poultry farmers have to follow for day-old chicks which they obtain from Venkateshwara's hatcheries zonal breeder farms. The second is for layer birds known as "VHL Commercial Layer Management Guide".

The company insists that suppliers follow these protocols and they are monitored on a daily basis by a staff member. A veterinary doctor appointed by Venkateshwara visits all the farms on a fortnightly basis and checks the health of the birds.

The egg powder is sold to Eastern & Western Europe, Japan, Middle-east and Far-east.

As in the case of SKM, poultry farms which supply eggs to Venkateshwara have a contract with Venkateshwara. The eggs produced are taken daily by Venkateshwara and the farmer has a ready market at his doorstep. Even if the eggs are not suitable for processing to powder, the company sells them in the local market; the poultry farmer is thus assured of the sale of eggs throughout the contract period. The farm enters into an annual contract with

Venkateshwara and the terms of the contract (including rate of egg) are fixed for the contracted year.

The following farms supply to Venkateshwara's unit for egg powder processing: Own farm known as VHL Contract Layer Farm; K Narayana Reddy Poultry Farm; Seetha Ramaraju Poultry Farm; Anurag Poultry Farm; and SK Reddy Poultry Farm

Due to strong linkages with the company, no one can visit these farms without the permission of the main unit. The research team requested the General Manager of Venkateshwara for permission to visit the supplier farms. While they did not refuse outright, they kept postponing the date. Finally, the date got pushed beyond the date of the study contract.

A veterinarian working with the egg powder unit until a few years ago gave us information about the SOPs followed at different farms. They are as follows:

- The day-old chicks are bought from zonal breeder farms to procure BV 300 chicks.
- The feed comes from the Venkateshwara hatcheries' sister company Uttara Foods and Feeds Pvt Ltd in Karnool, Andhra Pradesh.
- Strict protocol is followed for the eggs produced and water, feed and eggs are monitored daily at the laboratory. Egg powder is tested at another laboratory in Hyderabad owned by Venkateshwara.
- A veterinarian is appointed for all contracted farms. He has to monitor the medicines and vaccines given to the birds in the farm.
- The cage size for birds is –
 - Brooding cage- 30"x15"x15" (App 8 – 9 chicks) 30 sq inch/ bird
 - Growing Cage - 20"x15"x18" (App 6 growers) 50 sq inch / bird
 - Layer cage - 16.5"x15"x18" (App 4 layers) 60 sq inch / bird
- Medicines are procured from the local market. The majority of vaccines comes from Ventri Biologicals in Pune (Maharashtra) which is also a branch of Venkateshwara.
- Beak trimming is done before the birds are nine days old. Moulting is not practised on the farm.

As the farm visit could not be undertaken during the study period, data gathered from various people could not be verified.

Table 9 Details of Venkateshwara Company Operations

No	Operation	Name of the Supplier / Actor	Specifications/ Details	Standards Followed
1	Hatchery	Venkateshwara Hatcheries Ltd, Lonikalbhor, Pune, local hatcheries supplying BV 300 DOC in Hyderabad @ 27 Rs / Chick (Current chick cost – May 2010)	The parent stock of the layer breed BV 300 is at Loni village, nearly 30km from Pune, Maharashtra; breeder stock is at zonal hatchery, Hyderabad, Andhra Pradesh	VHL SOPs for chicks, commercial layer management guide by VHL
2	Day-old chick transporter	Venkateshwara Hatcheries Ltd DOC transporters	DOC are transported from Zonal Hatchery to farms in Shadnagar, Veljerla, Hyderabad	As per company standards – DOCs have to be transported in cool temperature, cotton soaked in water or pieces of watermelon be spread in the chick boxes to maintain humidity.
3	Farms raising layers	One own farm – CLF and 4 contracted out farms, viz. K Narayana Reddy PF, Seetha Ramaraju PF, Anurag PF, SK Reddy PF	Total capacity of farms is 1.8 million layers	VHL commercial layer management guide SOP
4	Small-scale producers	Two small-scale producers (50,000 capacity)		VHL SOP for chicks and farm management
5	Medium-scale producers	One medium-scale producer (50,000 up to 100,000)		VHL SOP for chicks and farm management
6	Large-scale producers	Two large scale producers (over 100,000 capacity)		VHL SOP for chicks and farm management
7	Egg transporters	Local transporters	Annual contract for transport of eggs to processing unit. The truck / lorry to be cleaned at farm daily. The vehicle is not allowed to enter more than one farm in a day. Separate vehicle for all farms	No standard SOP followed, only points like daily egg transfer to unit, daily washing of vehicle and disinfectant spray at farm and unit level are taken care of
8	Egg processors	Venkateshwara Hatcheries – Balaji Foods Pvt Ltd.	The processing factory is at Veljerla Shad Nagar, Hyderabad, Andhra Pradesh	Self RMP, EIC standards
9	Exporters (storage and transportation)	Venkateshwara Hatcheries – Balaji Foods Pvt Ltd.	Storage at Shadnagar unit for some time and then export from Hyderabad Airport	Special storage room at the unit
11	Transporters (finished layers)	Local traders for sale to local market	All the finished layers are transported in one truck contracted on the basis of seasonal demand	No standard SOP followed
12	Slaughterhouses / other terminal facilities	Local butchers, hotels	Stunning by jerk, cutting of jugular vein and de-blooding, de-feathering	<i>Halal</i> method of slaughter
13	Feed procured from	Uttara Foods and Feeds Pvt Ltd (Sister branch of Venkateshwara's) Feed factory in Karnool	Regular suppliers of maize, soya from different parts of country, constant check for residues at own labs	Venkateshwara SOP for feed ingredients, no non-vegetarian source of feed is allowed

14	Medicine procured from	Ventri Biologicals, Pune	Medicines are stocked as per requirement at farms and used as per requirements	Venkateshwara SOP for disinfection of shed, cage, feeder, drinkers, wire mesh, etc, stress busters as per recommendation by Venkateshwara's
15	Vaccines procured from	Venkateshwara Biosentry Ltd., Pune, Intervet India, Indobiocare, Indovax, Fortedodges	Vaccines are procured from zonal branches of the companies and used at farms when required	Venkateshwara SOP for vaccine production, vaccine administration according to protocol and veterinarian's supervision, specially trained vaccinators are used to vaccinate large quantities of birds
16	Equipment procured from	VR Equipment Limited Venkateshwara House"114/A/2, Pune-Sinhagad Road, Pune -411 030. Tel.: 24251530 vivr@vsnl.net ,	The cage length depends on farm capacity. For farm-level equipment, local cage and equipment supplier at Hyderabad	
17	Egg powder processing unit equipment from	USA, Holland		

Venkateshwara Hatcheries Pvt Ltd: Recommended Practices in Layer Farming Suitable for Egg Processing

Farm Selection for Egg Processing Plant (EPP)

1. Egg processing plants must use only eggs produced at farms registered as layer farms by Export Inspection Authority, Government of India.
2. Isolated large-sized cage farms with minimum of 100,000 egg production per day are encouraged for registration by authorities for supply of eggs to EPPs.
3. Farms are advised to maintain separate brooding and growing facilities to keep the flocks healthy.
4. Only farms with no past history of major disease outbreaks and good management practices are selected to ensure good production.
5. Quality control staff of egg powder plant needs to be placed at the farms for 24x7 surveillance and monitoring so that prescribed / approved systems are strictly followed.

Good Management Practices at Farm

1. Good bio-security measures like isolation, shed-to-shed gap, no visitors, footwear change, foot bath, etc., must be ensured to reduce bacteria and viral loads in the farm, thereby keeping the flocks healthy and minimising the scope for disease outbreaks.
2. Sufficient shed rest needs should be given between flocks, whenever replacement of flock takes place. This is necessary to ensure that chicks are reared in clean and healthy atmosphere.
3. After liquidation or shifting of each flock at the farm, thorough cleaning and terminal disinfection with flame gun should be undertaken to reduce bacteria and viral load.
4. Freshly inducted layer chicks and birds should be vaccinated and managed as per guidelines by way of lighting, heating, ventilation. Chicks and birds should be provided nutrition and feeding as per the prescribed schedule.
5. There should be strict restriction on movement of men and materials; no outside vehicle should be allowed inside the farm premises.
6. Footwear needs to be changed by all workers / visitors at the entry gate and staff should dip the farm footwear in disinfectant solution in footbath before entering the sheds.
7. Water, bird tissues, faecal matter should be tested as prescribed at regular intervals and test results be monitored by quality control of egg powder plant.
8. Egg storage godown should be properly ventilated and eggs stored in stacks of seven trays ensuring first-in-first-out policy for loading to EPP processing.
9. Sheds, feed godown, egg storage and other premises should be regularly and thoroughly cleaned of cobwebs, dust, etc., to avoid contamination of feed and egg surface.

10. Sheds and store godowns should be rat-proof; the whole farm should be free of fruit-bearing trees and ploughed regularly to be kept free of weeds, grass, etc.

Feed Management and Recommended Practices

1. As chemical residues in eggs occur mostly through ingestion of feed, maximum caution is needed in feed formulation and selection of feed ingredients.
2. Maize and cereals grown in irrigated areas compared to those rain-fed areas have lower probability of using banned pesticides like DDT, BHC, etc., in fields.
3. Feed formula should have only approved ingredients. Use of any form of animal protein like fish, fishmeal, meat meal, bone meal, etc., is not allowed in farms supplying eggs to EPP.
4. Coccidiostats, growth promoters, antibiotics not approved by the EU / RMP are not permitted for use in feed.
5. Toxin binders or pro-biotics and organic acids should be used only with the approval of quality control of EPP.
6. If it is necessary to use any antibiotic (as approved in RMP), strict records should be maintained and withdrawal period adhered to as suggested by the quality control of EPP.
7. To get good colour of yolk, minimum 30% maize should be maintained in the feed.
8. To get good egg white, balance protein should be maintained at 17%.
9. Minimum energy 2,450 kcal should be maintained in the diet.
10. To have good shell strength, DCP (di-calcium phosphate) should be maintained at 1.3% in the feed along with Vitamin D3.
11. Genetically modified ingredients should not be used in the feed.
12. Water should be treated with hydrogen peroxide or chlorine and analysed once in a week as per the residue monitoring plan.

Steps Taken by Management at Egg Processing Plant:

- Selection and regular monitoring of farms to ensure eggs are as per specifications of EPP.
- 24x7 supervision of farms by qualified staff specially trained by EPP for self-monitoring of residues.
- Regular collection of samples of water, bird sera & tissues, feed and analysis both in-house and at outside labs.
- Ensure timely collection and transportation of eggs to plant during cool hours on first-in-first-out basis.
- Checking eggs at the time of receipt, samples for testing, on-line liquid and powder sampling and testing.
- Farm-wise processing of eggs for traceability and comprehensive testing of finished powder testing as per plant / EU / buyer specifications.

Other Statutory Measures

1. Export Inspection Agency issues a health certificate for every consignment of egg products for export to EU/non-EU countries on the basis of monthly monitoring of samples.
2. EIC, through a nominated outside agency, will draw samples from farm and plant to analyse strict compliance of prescribed measures. It will collect the yearly cumulative data of RMP & self-RMP analysis for submission to the EU Commission.
3. The EU team will periodically visit the plant, farms and EIC-approved laboratories for auditing and verification of RMP systems.
4. The EIA will organise plant visit every two years for checking the lab records, plant hygiene, process and farms.

List of Registers maintained at Farm

1. Daily production and flock performance along with dispatch
2. Veterinary prescription and daily use of medicines register
3. Residue monitoring
4. Sample collection receipt
5. Egg collection receipt / Dispatch receipt
6. Feed composition
7. Visitors

3. Ovobel Foods Ltd:

Ovobel egg powder unit was established in 1995-96 at Kolar, Karnataka in collaboration with a Belgian Company. Ovobel buys eggs from farmers in Mysore and Davanagere district of Karnataka. Currently, there are three farmers (two from Mysore and one from Davanagere) who supply to Ovobel. The value chain structure of the Ovobel egg powder unit is as follows: Ovobel has a production capacity of 600,000 eggs. They can break 600,000 eggs per day. Currently, the demand is met from three suppliers, as mentioned above. The study team visited to two farms, namely, Krishna Farm and Ashraya Farm in Mysore. Findings and observations about each farm were as follows:

Table 10 Details of Ovobel Company operations

N.B. Ovobel does not have any SOP to be followed by their supplier farms. The only rule they have to follow is to inform Ovobel in case of use of antibiotics and vaccines.

No	Operation	Name of the Supplier / Actor	Specifications/ Details	Standards Followed
1	Hatchery	VHL chicks from local breeder of BV 300 in Karnataka, or very rarely Lohman chicks from Suguna zonal hatcheries	Mainly BV 300 breed of chicks is used for layer poultry farms but in case of increased rate of chicks or non-availability, they also rear Lohman chicks from Suguna Poultry Farms	VHL / Hatchery SOP for chick health and management
2	Day-old chick transporter	Local transporters	As per company standards – DOC have to be transported in cool temperature, cotton soaked in water or pieces of watermelon be spread in the chick boxes to maintain humidity	VHL hatchery SOP
3	Farms raising layers	3 farms - 2 farmers from Mysore and 1 farmer from Davanagere in Mysore district in Karnataka		
4	Small-scale producers	No small scale farms	-	-
5	Medium-scale producers	1 medium scale producer in Davangere, Karnataka	Supplies about 100,000 – 150,000 eggs per day	Own SOP for management, Hatchery SOP for chick mngment
6	Large-scale producers	2 large scale producers in Mysore, Karnataka	Capacity 220,000-450,000 birds, supplying 150,000-300,000 eggs/day each to Ovobel	Own SOP for management, Hatchery SOP for chick mngment
7	Egg transporters	Farm contracted local transporters	Daily delivery of eggs at unit, disinfection at Processing unit only.	No Standards protocol is followed
8	Egg processors	Ovobel Foods Ltd		SOP for egg powder processing
9	Exporters (storage and transportation)	Ovobel Foods Ltd		
10	Transporters (finished layers)	Local traders and cutters	Sale mainly at Kasargode and Calicut dstrs, Kerala	No standards protocol is followed
11	Slaughterhouses / other terminal facilities	Local traders and cutters		
12	Feed procured from	All the three farms have their own feed mill on the farm premises	Non-vegetarian feed source in the form of fish meal is used at low concentration	No SOP of Ovobel

13	Medicine procured from	Many Indian and foreign companies, herbal medicines also used	Many companies in veterinary products are present in Mysore, Sanitary and Phytosanitary measures are followed as per requirement	Manufacturers instruction on use of medicine is followed, should inform Ovobel on use of medicines
14	Vaccines procured from	Ventri Biologicals, Intervet India, Indobiocare, Indovax, Fortedodges	All companies have distributors in respective area, so procuring vaccine of choice is easy	Veterinarian's advice, vaccines protocol as per hatchery SOP
15	Farm equipment procured from	Gartech Cage Manufac-turers, Mysore, Karnataka	Fixed cage size and type of material, only capacity varies	Standard cage size according to other farms are followed
16	Egg processing unit equipment from	USA & Holland		

Appendix 4 Practices to be followed to ensure GAP Standards as set by the Export Inspection Council, Government of India

Procedure for approval of establishment

- a. HACCP Manual (including the Sanitary Standard Operating Procedures, process flow chart(s) with product description, manufacturing details in each step, Self-Residue Monitoring Plan.)
- b. In the case of establishments meant for export to the EU, attested/certified copy of test report from EIA lab/EIC approved lab in respect of water complying with EC directive No.98/83/EC dated 3.11.1998 used during processing activities (countries other than EU-IS: 4251 (other than radiological parameters)).
- c. Location and Layout plan of the establishment (site plan and building plan), showing all infrastructure and equipment facilities.
- d. Layout showing the process/product flow, personnel flow, water flow (Indicating serially numbered water taps) and effluent flow, in evidence of meeting food safety requirements.
- e. Attested/certified copies of documents proving legal identity of the applicant establishment and scope of their operations.
- f. Attested/certified copy of lease agreement for the premises and building, where ever necessary.
- g. List of identified layer farms meeting the minimum requirements from which the establishment intend to procure eggs for processing along with details like address and distance from the processing establishment.
- h. Bio-data of the technologist(s)
- i. An Undertaking and Guarantee.
- j. Attested/certified copy of consent letter issued by Pollution Control Board concerned.
- k. Attested/certified copy of the order allotting IEC number.

General hygiene provisions for Primary Production and Associated Operations:

I. Hygiene provisions

1. Food business operators are to ensure that shell eggs are protected against contamination, due to processing that shell eggs will subsequently undergo.

2. Notwithstanding the general duty laid down above, food business operators are to comply with appropriate importing countries and national legislative provisions relating to the control of hazards in primary production and associated operations, including:
 - (a) measures to control contamination arising from the air, soil, water, feed, fertilizers, veterinary medicinal products, and biocides and the storage, handling and disposal of waste; and
 - (b) measures relating to animal health and welfare that have implications for human health, including programmes for the monitoring and control of zoonoses and zoonotic agents.
3. Food business operators producing poultry shell eggs are to take adequate measures, as appropriate:
 - (a) to keep any facilities used in connection with primary production and associated operations, including facilities used to store and handle feed, clean and, where necessary after cleaning, to disinfect them in an appropriate manner;
 - (b) to keep clean and, where necessary after cleaning, to disinfect, in an appropriate manner, equipment, containers, crates, vehicles and vessels;
 - (c) as far as possible to ensure the cleanliness of poultry;
 - (d) to use potable water, or clean water, whenever necessary to prevent contamination;
 - (e) to ensure that staff handling foodstuffs are in good health and undergo training on health risks;
 - (f) as far as possible to prevent animals and pests from causing contamination;
 - (g) to store and handle waste and hazardous substances so as to prevent contamination;
 - (h) to prevent the introduction and spread of contagious diseases transmissible to humans through food, including by taking precautionary measures when introducing new animals and reporting suspected outbreaks of such diseases to the competent authority;
 - (i) to take account of the results of any relevant analyses carried out on samples taken from animals or other samples that have importance to human health; and
 - (j) to use feed additives and veterinary medicinal products correctly, as required by the relevant legislation.
4. Food business operators are to take appropriate remedial action when informed of problems identified during official controls.

II. Record-keeping

5. Food business operators are to keep and retain records relating to measures put in place to control hazards in an appropriate manner and for an appropriate period, commensurate with the nature and size of the food business.
6. Food business operators producing poultry shell eggs are, in particular, to keep records on:
 - (a) nature and origin of feed fed to the animals;
 - (b) veterinary medicinal products or other treatments administered to the animals, dates of administration and withdrawal periods;
 - (c) the occurrence of diseases that may affect the safety of products of animal origin;
 - (d) the results of any analyses carried out on samples taken from animals or other samples taken for diagnostic purposes, that have importance for human health; and
 - (e) any relevant reports on checks carried out on animals or products of animal origin.

Requirements for approval of establishment for processing Egg products for Export:

1. Surroundings

- 1.1 The premises shall be kept clean and shall have defined curtilage. All the roads in the premises shall be concreted / tarred or turfed to prevent wind blown dust.
- 1.2 There shall not be any swamps, stagnant water or signs of any rodent harbourage inside the premises.
- 1.3 The surroundings shall be reasonably free from objectionable odours, smokes, dust and other contaminants.

2. Constructions and Layout

- 2.1 Immediate surrounding - tarred/ concreted to prevent contamination from the surroundings.
- 2.2 The design and layout shall be such as to preclude contamination.
- 2.3 The lay out of different sections - smooth and orderly flow of work - prevent possible cross contamination and backtracking. All the egg products handling areas shall be separate from areas used for residential purpose.
- 2.4 There shall be adequate lighting and ventilation and light fixtures shall be protected with proper covering.

2.5 The layout shall ensure sufficient space in different sections for machinery, equipment, personnel etc. without congestion.

2.6 The building shall provide sufficient protection against the entry and harbourage of rodent, insects, birds, other animals etc.

2.7 All the entry points shall have suitable air curtains or other suitable arrangements to prevent the entry of flies.

2.8 Wood shall not be used in the factory, except inside the cold storage.

2.9 Non-operative areas inside the establishment shall be properly cordoned off to avoid possible cross contamination

3. Egg receiving section

3.1 There shall be a raised platform for receiving the material and the sides and roof of the platform shall be sufficiently protected from extraneous contamination.

4. Workers entry points

4.1 Suitable washing and sanitizing facilities for feet and hands shall be provided at the entry points.

4.2 The washbasins shall be provided with foot operable taps or non-hand operable taps.

4.3 Liquid soaps, disinfectants, nailbrushes, single use towels / hand dryers etc. shall be provided in sufficient quantities at all entry points.

4.4 Waste bins provided for collecting used towels shall be of foot-operated type.

5. Ceiling, walls and floors

5.1 The floor of the processing areas shall be smooth, impermeable and easy to clean and disinfect. There shall be no water stagnation on the floor. The floor shall have sufficient slope opposite to the flow of work or side ways.

5.2 The wall to floor and wall-to-wall junctions shall be rounded off to facilitate easy cleaning.

5.3 The walls should be durable, smooth, light coloured and easy to clean and disinfect.

5.4 The walls should not have projections and the entire fitting on the wall shall be made in such a way so as to clean and disinfect them easily. If possible, the electric switches or other fittings shall be fixed in other areas where no handling of egg product is carried out.

5.5 The ceiling shall be free from cracks and open joints and shall be smooth and easy to clean.

5.6 If structural elements or fittings are suspended below the ceiling, suitable protection shall be given to prevent falling of debris, dust or droppings.

6. Doors, windows and ventilators

6.1 Doors - Tight fitting and the windows and ventilators shall have fly proofing nets to prevent the entry of flies.

6.2 All doors and windows shall be durable and made of corrosion resistant material and windowsills, if any, shall slope inwards. The windows/ ventilators shall be constructed at least one meter above the floor.

6.3 The doors - self-closing type.

6.4 Mechanical ventilation/exhaust fans shall be provided in areas where stagnation of air, condensation of fluid etc. are present


6.5 The opening of ventilation/ exhaust fan shall be provided with suitable fly proofing system.

- Drainage
- Change rooms and toilets
- Store rooms
- Water
- Personal Hygiene

Residue Monitoring Plan

EIC/RMP (EP)/2009-10
Dated: 23/03/09

Residue Monitoring Plan (RMP)
for
Egg Products
2009-10



Export Inspection Council,
Ministry of Commerce & Industry, Govt. of India
New Delhi, YMCA Cultural Centre Building, 3rd Floor,
1 Jai Singh Road, New Delhi-110001
Tel :0091-11-23748188, 23748189, Fax: 0091-11-23748024
E-mail: eic@eicindia.org
Web Site www.eicindia.org

Residue Monitoring Plan of India for Egg Products – 2009-10		
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RESIDUE MONITORING PLAN (RMP) FOR EGG PRODUCTS FOR EXPORT – 2009-10

1 Introduction

Presence of residues of environmental contaminants and veterinary drugs in food products is a major concern for the food business all over the world. Under the Export (Quality Control & Inspection) Act, 1963 Government of India is committed to ensure safe products for the export markets. Keeping the objective in view, the residue-monitoring plan for egg products has been formulated. This plan would ensure monitoring of egg products for residues at each stage of production from farm to fork to guarantee a safe food.

The Residue Monitoring Plan is in line with the GOI Order dated S.O. 1442 (E) dated 19th December, 2005 on export of egg products and is designed to monitor the residues of drugs & pesticides in Egg products for units approved by EIAs for the purpose of exports.

2. Objectives of the RMP

The objectives of monitoring residues of drugs, pesticides and heavy metals in egg products intended for export is to:

1. comply with the Council Directive 96/23/EC dated 29th April 1996.
2. detect any illegal treatment (s)
3. ensure compliance with the MRL for drugs and pesticides in water used at the farm, in compound feed, tissues, shell eggs and in final product.
4. establish a system of corrective action in the event of detection of residues higher than the prescribed limits by issuing alert information and follow up visits
5. ensure that the egg products exported from India meet the prescribed regulatory requirements of the importing countries.

3. Scope of the RMP

This residue monitoring plan shall be applicable for egg products processing plants, poultry farms and other related sites for export vide Order & Notification published in the Gazette of India, issued on 9th September 2003, and their poultry farms and feed mills. The farms and feed mills would be registered by the processors as per the format enclosed at X. Specific code number would be allotted to farms and feed mills and the same would be communicated to EIA, EIC and the concerned laboratory.

4. Egg Production in India

Total production of eggs for the last four years is given below.

2004-05*	2005-06*	2006-07*	2007-08*
(Million nos)	(Million nos)	(Million nos)	(Million nos)
45201	46166	47343	53532.4

Qty of Egg products exported during 2007-08 is 1355246MT**.

(Source: DAHD, India, ** website of APEDA)

5 Residue monitoring in India

There are three approved egg products processing establishments in India. In view of the growing health consciousness among the consumers all over the world and the introduction of strict quality control measures by Govt. of India on egg products, for export, implementation of GMP/GHP, HACCP has been made mandatory for all egg products processing units approved for export in India. In addition, the residue monitoring plan for egg products has been designed and is being implemented as per to comply with the Council Directive 96/23/EC dated 29th April 1996.

The HACCP system is meticulously implemented in all the egg products processing units in India. The personnel attached to these units check for various hazards in the egg products and maintain necessary records. The HACCP implementation is being monitored through a surveillance mechanism.

6 Official laboratories and their competence.

The following laboratories are involved in the monitoring of residues in egg products, and the same will be utilized for the RMP also.

6.1 Laboratories

I) EIA Laboratories

1. Pilot Test House
Export Inspection Agency – Mumbai
E-3, MIDC Area, Marol , Andheri (East)
Mumbai – 400 093
Tel: 2836 3396, 3397, 3401, 2834 9619;
E-mail: pth@eicindia.org
2. Export Inspection Agency-Chennai
6th floor, C.M.D.A. Tower-II
1, Gandhi Irwin Road
Egmore, Chennai-600 008
Phone: 044 28552841/2
Fax: 28552840
E-mail: eiamadras@eicindia.org
3. Export Inspection Agency-Kolkata
14/1B, World Trade Centre
Ezra Street,
Kolkata –700001
Fax: 033- 22354562
Tel: 22355004/22354606
E-mail: eiacalcutta@eicindia.org

II) EIC approved laboratories

As per Annexure-II

6.2 Level of competence of the laboratories

The EIA Laboratories have the capability to test for pesticides residues, heavy metals, antibiotic residues namely Chloramphenicol and metabolites of Nitrofurans, namely AOZ, AMOZ, SEM and AHD. The labs are equipped with sophisticated equipment like Liquid Chromatography double Mass Spectrometer (LC MS MS), HPLCs, Gas Chromatograph, Atomic Absorption Spectrophotometers etc. Trained and skilled professionals manage EIA labs. And are working under the direct supervision of Competent Authority i.e. Export Inspection Council of India. The Labs are implementing ISO/IEC 17025 and three labs have been NABL accredited and one lab is in the process of getting NABL accreditation.

M/s Shriram Institute for Industrial Research, Delhi and Bangalore, M/s Interfield Laboratories, Kochi and Vimta Specialities Ltd., Hyderabad are approved labs under the labs approval scheme by EIC. All these labs are well equipped to test all the residues and have NABL accreditation.

7 Group of residues covered under RMP

In accordance with the Council Directive 96/23/EC of 29th April, 1996, sampling would be at least one per 1000 tonnes of annual production, with a minimum of 200 samples for each group of substances.

The break-up of the same is given below.

The following break down shall be respected

70% of the samples shall be tested for groups: A6, B1 and B2 (b)

30% of the samples shall be analysed from substances in group B3 (a)

Group of substances	Substances group	Compound feed at farm level	Water at farm level	Shell Eggs (farm level)	Packing centre (Shell Eggs)	Final product	Total no. of Samples
Op. A	Compounds included in Annex IV to Council Regulation (EEC) No. 2377/90 of 26.6.90	18	18	20	42	42	140
A6	Chloramphenicol Dimetridazole Metronidazole Ronidazole Iprnidazole Nitroimidazole Nitrofurans(including furazolidone) And metabolites						
Gp. B	Antibacterial Substances	18	18	20	42	42	140
B1	Spectinomycin Sulfonamides Macrolides Erythromycin Tylosin Lactamase inhibition Colistin Lincosamide Lincomycin Aminoglycosides Neomycin Tetracycline Choro-tetracycline Oxy-tetracycline Tetracyclines						

B2b	Anti-parasitic agents piperazine derivatives	18	18	20	42	42	140
	Anticoccidials Amprolium, boscalid, lasalocid (in egg white), cyromazine Agents acting against endo-parasites Benzimidazoles and pro-Benzimidazoles Flubendazole						
B3a	Organochlorine Compounds	11	10	12	15	13	60
	Aldrin and dieldrin Heptachlor Heptachlor epoxide DDT (all isomers) Dicofol α-endosulfan Endosulfansulfate Endrin HCH (all isomers) Methoxychlor PCB						
Total no. of samples							200

'Packing centre' refers to an establishment where eggs are graded by quality and weight. Surveillance of Group A substances is aimed at detecting the illegal administration of prohibited substances and abusive administration of approved substances while surveillance of Group F substances is aimed at controlling the compliance with MRLs for residues and veterinary medicinal products.

8 Sampling

8.1 Sampling procedure

The samples of compounded feed, water, tissue, Shell eggs and egg products shall be drawn by the EIA official as per the sampling procedure given at Annexure-I in such a manner that a representative sample is obtained. Samples shall be taken in such a way that it is always possible to trace back to the farm of origin of eggs.

Details of samples drawn shall be filled in the sample slip as at Annexure-III by the EIA officer and the sample along with the slip shall be given to the lab official.

8.2 Personnel responsible for collection of samples

EIC has regional offices (EIAs) at Kochi, Kolkata, Mumbai, Delhi & Chennai and 37 field offices. The authorised field official of EIA from the regional offices shall collect the samples as per the schedule from the poultry farms, feed mill mixing plants, processing plants and send the same to the approved laboratories. The sampling is unforeseen, unexpected and with an element of surprise.

8.3 Fixing number of samples for RMP based on the Egg product Export.

The total number of samples (Annexure IV) to be drawn would be sampled by the EIAs. As the RMP for 2009-10 the targeted number of samples shall be completed by 31.03.2010, for which each EIA shall draw up the monthly plan for drawal of samples. For some reason, if the number of samples, to be collected by each EIA, on monthly basis are not completed the same shall be undertaken in the next month.

8.4 Collection and transportation of samples ✓

During collection of primary sample (one or more units taken from one position in a lot) minimum of six to a maximum of thirty primary samples should be taken from Compound feed, water, Tissues, shell eggs and egg products to represent the entire lot.

Laboratory sample shall be collected in triplicate must be placed in clean, inert containers such as HDPE of food grade packaging material or PET bottles, which provide secure protection from contamination, damage and leakage. The containers shall be sealed securely, labelled and the sampling record shall be attached.

The samples should reach to the concerned approved lab immediately on collection and in any case period between the collection of sample and receipt of sample at lab should not exceed 2 days with adequate refrigeration facility. However samples of tissue should reach the laboratory within 24 hours to avoid putrefaction)

8.5 Preparation and handling of Lab samples

The primary sample shall be combined and mixed well to form the bulk sample.

Where the bulk sample is larger than required it should be divided to provide a representative portion. Portioning for laboratory sample should be done at this stage (Minimum of 3 samples, 1 each for laboratory, concerned EIA and processor). The size of the sample is to be determined as in Annexure-I

Immediately on receipt of the sample, the same shall be decoded and stored in deep freezer / refrigerator as applicable. When the test results are found negative in the sample analysed, the other portion stored in the freezer/ freeze is discarded only after 60 days. If the initial test shows positive, the remaining sample shall be analysed for confirmation of results.

The lab shall issue the test report to concerned EIA as per Annexure- V within 15 days.

9.0 Alert intimation and communication of results

9.1 Communication of results

The results shall be communicated by the laboratory to EIAs within 15 days of receipt of the sample. In the case of positive test results, lab shall immediately inform EIA. Internal Alert intimation shall be issued as per Annexure-VI to the concerned farm / unit by the concerned EIA. The EIA deputes an officer to conduct an immediate inspection of the place from where the sample was drawn to find out the root cause of the contamination including backward linkages and assists in identifying preventative measure to stop the recurrence of failure.

A monthly summary of the samples to be drawn as per RMP, actual samples drawn, tested, test results, detection level, method of testing and the action taken in case of positive result are communicated to the Competent Authority (EIC) as per Annexure-VII.

9.2 Official control measures by the Authorities concerned

In case of positive results, from the samples drawn from the processing unit, the EIA shall obtain without delay

- All the information required to identify the animal and farm of origin or departure.
- Full details of the examination and its results.

In addition to above, EIA shall initiate the following actions.

- Shall carry out investigation on the farm. In case of illegal treatment, an investigation of the source or sources of the substances or products concerned would be carried out.
- The live stock concerned and the product is kept under official control.
- Where there is evidence of residues of authorised substances or products of a level exceeding the maximum limit for residues, the EIA shall carry out the investigation, to determine why the above limit was exceeded.
- In the event of repeated infringement of MRL, the checks on the establishment shall be carried out for a period of six months.
- The batch of the product, which the sample exceeds the limit of residues shall be disposed suitably with supporting records.
- For a further period of at least 12 months, the farms belonging to the same owner shall be subjected to more stringent checks for the residues in question.
- A comprehensive report covering the investigation carried out on above, shall be forwarded to EIC.

EIA shall also advise the concerned exporter to

- Refrain from exporting egg products from the processing unit in case where samples, drawn under the sampling procedure are found non-complying.
- Identify the exact source of the contaminated egg product and not to accept the raw material from the same source till corrective actions have been completed.
- None of the egg products of batches found failing in final product testing should be exported to EC
- Conduct regular training for all concerned to minimise contamination of egg products.

9.3 Provision for re-testing of positive samples.

The positive samples may be re-tested on request from the unit for re-confirmation. The concerned EIA shall co-ordinate re-testing in case of positive samples. The control sample shall be tested in two different EIA lab/EIC approved labs. The result shall be treated as positive even if one of the two samples is found to be positive on re-testing. In case both the samples pass the MRL requirement on re-testing, the concerned EIA shall withdraw internal alert, which shall take effect from that date.

10.0 MRLs for Group A and Group B substances covering veterinary drugs and Contaminants.

Actual compound along with its MRL, detection limit and method of test is given at Annex-VIII.

11 Method of analysis

Unless otherwise mentioned, the methods described in manual / Journal of Association of Official Analytical Chemists or the methods prescribed by the Community Reference laboratories will be followed using the equipment mentioned against the substances as given at Annex- VIII.

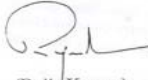
11 Information on legislation

The legal aspects for egg products are covered in Order S.O. 1442(E) dated 19th December 2003 issued by Ministry of commerce & Industry, Govt. of India.

The Residue Monitoring Plan is in line with Directive 96/23 /EC.

12. Responsibilities of egg processors, farms and feed mills

The feed mills and farms supplying eggs to the processor will be registered with the egg processor. The egg processor shall maintain records of feed mills and egg supplying farms as per Annexure-IX and Annexure-X, respectively, and shall make available a copy of these records to the EIA monitoring officer at the time of monitoring/ drawing of samples.


(Rajiv Kumar)
Director, EIC

New Delhi
Date: 23 March 2009

N.B. Annexures not included here

Appendix 5 UNECE Standards

The purpose of the UNECE standard is to define the quality requirements which the produce must satisfy at all stages of marketing, after preparation and packaging. The standard does not apply to products sold by retail. Main items are:

A. General quality criteria

Egg products must be homogeneous, fit for human consumption, practically free from shell fragments and foreign matter. The taste, colour and odour of egg products shall be natural and characteristic of each product. In the case of dried egg products, these shall be easily reconstituted.

B. Microbiological criteria

In addition to any national requirements, the microbiological condition of the egg products shall be in conformity with the following minimum requirements:

1. Salmonellae

- i) *Salmonella* organisms should not be recovered from any of ten sample units examined when the test is carried out according to the method described ($n = 10$, $c = 0$, $m = 0$).
- ii) In products intended for special dietary purposes, *Salmonella* organisms should not be recovered from any of thirty sample units examined ($n = 30$, $c = 0$, $m = 0$).

2. Mesophilic aerobic bacteria

Mesophilic aerobic bacteria should not be recovered from any of five sample units examined when the test is carried out according to the method described in a number exceeding one million per gram, nor in a number exceeding 50,000 per gram from three or more of the five sample units examined, ($n = 5$, $c = 2$, $m = 5 \times 10^4$, $M = 10^6$).

3. Coliform bacteria

Coliform bacteria should not be recovered from any of five sample units examined, when the test is carried out according to the method described, in a number exceeding 1,000 per gram, not in a number exceeding ten per gram from three or more of the five sample units examined, ($n = 5$, $c = 2$, $m = 10$, $M = 10^3$).

C. Compositional criteria

Liquid, frozen or dried whole egg, egg yolk and egg albumen shall comply with the specifications given below. The percentages expressing composition shall be based on the egg portion only of the egg product.

Table 11 Compositional criteria for egg powder

PRODUCT	EGG SOLIDS CONTENT (minimum percent)	FAT CONTENT (minimum per cent)	FREE FATTY ACIDS (maximum per cent)
Liquid and frozen whole egg	23.5	9.8	-
Liquid and frozen egg yolk	43.0	26.0	-
Liquid and frozen egg albumen	10.5	-	-
Dried whole egg	95.0	39.0	3.5
Dried egg yolk	95.0	56.0	3.5
Pan dried egg albumen	84.0	-	-
Spray dried egg albumen	92.0	-	-

D. PROVISIONS CONCERNING FOOD ADDITIVES AND CONTAMINANTS

The use of food additives shall be in accordance with the legislation of the importing country. Egg products shall not contain contaminants such as pesticide residues, antibiotics, hormones or heavy metal contaminants in amounts greater than those specified in the legislation of the importing country.

E. PROVISIONS CONCERNING HYGIENE

The hygiene requirements for the production of egg products and the premises, equipment and personnel used or engaged in their production should be as specified in the Joint FAO/WHO Codex Alimentarius Commission Code of Hygienic Practice for Egg Products (CAC RCP 15-1976, Codex Alimentarius

Commission ALINORM 85 13).

F. PROVISIONS CONCERNING PACKING, TRANSPORT AND STORAGE

- (i) Egg products shall be packed in such a manner as to protect them adequately, and to prevent contamination. The packaging material shall not impart any taste, odour or colour to the egg products and shall be in accordance with legislation of the importing country.
- (ii) The transport of egg products should be in accordance with the requirements of the Joint FAO/WHO Codex Alimentarius Commission Code of Hygienic Practice for Egg Products. In addition, the transport of frozen egg products should conform to the Agreement on the International Carriage of Perishable Foodstuffs and on the Special Equipment to be used for such Carriage (ATP).

Guidelines for processing of egg products (UNECE standards (Paturkar, 2010))

Processors need to be sure that the egg products they produce are safe and suitable for human consumption. Eggs for processing should be visibly clean prior to breaking and separating. Cracked eggs may be processed. Broken eggs should not be processed and should be disposed off in a safe manner. Dirty eggs should be disposed off in a safe manner or may be cleaned. Separating the egg contents from the shell should be done in a manner that will, as far as possible, avoid cross-contamination between the shell and egg contents, avoid contamination by personnel or from equipment, and permit examination of egg contents.

- (i) **Treatment** - Egg products should be subjected to a micro-biocidal treatment to ensure the products are safe and suitable. Micro-biocidal treatments, including heat treatment, should be validated to show they achieve the desired reduction in the number of pathogenic micro-organisms and result in a safe and suitable product. Where heat treatment is used, consideration should be given to time and temperature combinations. Pasteurized liquid egg products should be cooled rapidly, immediately after pasteurization and maintained under refrigeration.
- (ii) **Storage and distribution** - Egg products should be protected against external agents and contamination, e.g. direct sun light, excessive heating, moisture, external contaminants, and from rapid temperature changes, which could adversely affect the integrity of the product packaging or the safety and suitability of the product.

Appendix 6 Recommendations by Veterinary Universities and consultants for egg processing units and poultry farms (Kannan, 2010)

1. Pre-harvest (On farm) Approach

Pre-harvest approach involves raising of healthy chickens in a clean environment.

1.1. Raising of healthy baby chicks

- a) Pens used for rearing of chicks should be cleaned properly and disinfected with suitable disinfectant after a period of vacation.
- b) Chicks should be purchased from reputed breeders.
- c) Immediately after receiving baby chick, care should be taken for watering, nutrition and brooding management.
- d) Prophylactic health cover should be followed as per prescribed guidelines.

1.2. Feeding management

- a) Feed ingredients used for preparation of poultry feed should be tested and free of mycotoxins, pesticides, toxic metabolites, heavy metals, bacterial contamination and adulterations.
- e) Poultry raised for production of egg powder should be fed with only vegetable protein source.
- f) Layer should be fed in terms of quality and quantity to produce uniform eggs.
- g) Broilers should be fed in such a way to avoid an accumulation of excess adipose fat.
- h) Approved feed additives should be used in a permissible level.
- i) Maximum withdrawal period should be given to avoid residual effects in the final products.
- j) Alternate to antibiotics such as egg yolk immunoglobulins, probiotics, prebiotics, eubiotics, acidifiers and herbal preparations should be used as much as possible.
- k) Water used for poultry production should be pure and wholesome.
- l) Chlorine dioxide can be used as a non-toxic water sanitizer for producing safe products.

1.3. Housing management:

- a) Farm location and poultry house design will determine the locational and structural bio-security.
- b) As far as possible, chicks, growers and layers must be located in different premises and for boilers all-in and all-out system should be followed.
- c) Cage should be designed in such a way to provide better spacing and comfort.
- d) Internal surface of the cages for broiler and layer should be smooth to avoid bruises and cracking of eggs.
- e) Housing design must be aim at optimal cross, ridge and bottom ventilation.
- f) Manure should be properly disposed off.

1.4. Disease control management:

Poultry farmers across the globe face the devastating effects that poultry viruses have as they infect commercial poultry and spread diseases. The emerging diseases of economic importance with reference to international trade of poultry and poultry products are the avian influenza, Newcastle disease and zoonotic Salmonellosis.

- a) Clean environment should be maintained to reduce the infectious pressure in the production system.
- b) Farm sanitization, traffic and vector control are integral part of best farm bio-security measures.
- c) Approved vaccines and other medicaments only used.
- d) Flock profiling should be periodically followed.

1.5. Harvesting system

- a) Eggs should be periodically collected in a suitable tray and stored in a transit storage room.
- b) Broilers after reaching a market weight should be harvested in a suitable well designed transport cage for slaughtering.

2. Post-harvest (Off-farm) Approach

- a) After harvesting of eggs from farms, they should be exported as early as possible.
- b) Poultry processing plant should be underlined with HACCP guidelines.
- c) Final products should be tested for internal and external quality.
- d) Suitable and approved packaging materials should be used.

- e) Traceability is yet another food safety measure, followed in certain countries to trace back the farm from which it has originated by following bar coding procedures.

Appendix 7 Layer hen monitoring protocol

General Information - Laying hens on-farm Please fill in or tick as appropriate

Name of assessor	
Farm name	
Village, district, state	
Name of person interviewed	
Date	
Start time	

ASSESSMENT CONDITIONS

Weather during assessment:	
Outside temperature:	

Questions to farmer/caretaker

TYPE OF HOUSING

1.	Type of farm	0 = breeder farm 1 = hatchery 2 = grower farm 3 = layer farm	
2.	Number of birds on farm (at time of the visit)		
3.	Type of house: (take detail pictures and make a drawing of the cross section)	Type of cages / floor system / other, i.e. Number of rows of cages	
4.	House number assessed		
5.	Number of birds in house assessed		
6.	Date placed		

7	Age at placing		
8	Age at day of inspection		
9	Genotype (or brand)		
10	Free range:	yes / no	
11	Porch/Veranda*:	yes / no	
12	Type of outside wall:	0 = open 1 = wire mesh 2 = netting 3 = other i.e. :	
13	Number of sections in the house	No.	
14	Sections divided by: (If any)	wire/closed wall /other i.e.:	
15	Ventilation;	0 = mechanical 1 = natural 2 = natural plus mechanical 3 = other, i.e.:	
16	Other system characteristics:		

*Porch or veranda = area outside the hen house, connected to the henhouse and covered by a roof

Section: Bio-security

No	Question	Scoring scheme	
1	Is an all in / all out strategy employed for all houses on the site?	All in all out: <u>House</u> <u>Farm</u> 0 = No No 1 = Yes No 2 = Yes Yes	
2	How many staff are interacting with the birds in this hen house? (count staff with multiple tasks only once) (no)	Egg collectors (no.) Caretakers (feed, water) Veterinarians Supervisors Animal handlers (when shifting), other, i.e.	
3	Who is providing regular veterinary support?	0 = occasional visits external vet 1 = regular visits external vet 2 = part-time vet 3 = full-time vet	
4	How often does the house supervisor make inspection walks through the house?	0 = less than once per day 1 = once per day 2 = more than once per day	
5	How many spot checks do house supervisor	0 = no	

	make daily?	1 = sometimes 2 = regularly	
6	Do house supervisor have daily routines for checking food and water?	0 = no 1 = yes	
7	Where/how do you check it?	0 = office 1 = in hen house 2 = other place, i. e.	
8	Are there any other bird species kept on the farm? (e.g. turkeys, ducks, geese, pigeons)	0 = yes 1 = no if yes, what:	
9	Are there any mammals kept on the farm? (e.g. pigs, cows, dogs, cats)	0 = yes 1 = no if yes, what:	
10	Is any direct contact possible between other animals kept on the farm and laying hens?	0 = yes 1 = no	
11	How are wild animals prevented from entering the hen house?	0 = no prevention 1 = wire mesh 2 = wire mesh plus house design preventing rats & snakes 3 = several measures taken	
12	Is there frequent contact between the hens and visitors/people not working on the farm? (e.g. people visiting the farm to buy eggs)	0 = often 1 = sometimes 2 = never	
13	Are there separate ways for "dirty traffic" (feed supply truck, manure removal truck) and "clean traffic" (personnel in company cloths)?	0 = no 1 = yes	
14	Is company clothing available for personnel and visitors for each of the hen houses?	0 = no 1 = some staff 2 = yes	
15	How frequent is manure removed?	0 = deep pit system, manure remo-ved less than once per laying cycle 1 = more frequent manure removal	
16	Is there any contact between birds and their own manure?	0 = no 1 = only in litter or free range 2 = hens have access to manure storage	
17	Where are sick kept?	0 = no special arrangement 1 = in same shed 2 = in separate area 3 = kept in separate area inside the shed	
18	How often are dead birds removed (for general mortality)?	0 = occasionally 1 = a few times per week 2 = every day	
19	Where are dead birds stored and how are they disposed of?		

Section: Health Care

20	What antibiotics and anti-microbia are regularly added to the feed or water?		
21	What antibiotics and anti-microbia are		

	used in case of disease?		
22	What growth promoters are used?		
23	What stress busters are used?		
24	Beak trimming		
	Are the birds beak trimmed?	0 = no 1 = yes	
	At what age(s) are the birds beak trimmed?		
	What method is used the first time?	0 = cold scissors 1 = hot blade 2 = other:	
	What method is used the second time?	0 = cold scissors V-shape 1 = cold scissors – other 2 = hot blade 3 = other:	
	Who is carrying out the beak trimming?	0 = farmer and/or farm crew 1 = professional beak trimmer	

Section: Product Quality

25	Is the egg storage room separate and cooled?	0 = no separate room 1 = separate room, not cooled 2 = separate room, cooled	
26	How often are eggs removed from the farm?	0 = Less than once a week 1 = Once a week 2 = More than once a week	
27	Who checks for salmonella?		
28	How often is the farm checked for salmonella?	0 = never 1 = after each flock 2 = more than 1 time per flock	
29	When certified veterinary control is carried out (linked to animal health care)?	0 = never 1 = only in case of diseases 2 = frequent check by certified vet	

Section: Cleanliness

30	Was the house cleaned and disinfected before every new flock?	0 = no 1 = yes	
31	Did you disinfect the feeder system before the birds were placed in the house?	0 = no 1 = yes	
32	Did you disinfect the water system before the birds were placed in the house?	0 = no 1 = yes	
33	Were cages disinfected before the birds were placed in the house?	0 = no 1 = yes	
34	Were roofs and walls disinfected before the birds were placed in the house?	0 = no 1 = yes	

Section: Moulting and culling

35	Has the flock been moulted?	0 = yes 1 = no	
36	Will the flock be moulted?	0 = yes 1 = depending on market situation 2 = no	
37	How is it done or will it be done?	0 = deprived of water and normal food 1 = only deprived of normal food 2 = deprived of normal food, supply of low calorie food 3 = other, i.e.	
38	How long is food withheld from birds before they are captured for slaughter	Hours (calculate from the moment the feed troughs are empty).	
39	How long is water withheld from birds before they are captured for slaughter?	Hours	

Section: Care Taking

40	How many caretakers work in this house on an average day?	Number	
41	Do you have a routine for maintenance /check of equipment in the chicken house (feeders, waterers, electricity systems, foggers, fans)?	0 = no 1 = yes 2 = yes and written policy	
42	Do you do regular maintenance check of generator?	0 = no 1 = yes 2 = yes and written policy 3 = not applicable	
43	Do you do regular maintenance check of feed mill?	0 = no 1 = yes 2 = yes and written policy 3 = not applicable	
44	How do you monitor temperature in the shed?	0 = no monitoring 1 = staff perception & experience 2 = thermometer 3 = other, specify	
45	How do you control lighting?	0 = no lighting system 1 = manual lighting system 2 = automated lighting system	
46	Do you use extra lighting to create a photo period? If yes, what is the length of the photo period?	0 = no extra lighting If yes, length of photo period (hrs)	
47	What lighting pattern is used?	0 = continuous lighting 1 = intermittent lighting	
48	What is used for protection against sun, wind, rain and cold?	0 = nothing 1 = tarpaulin 2 = shading nets 3 = other, specify	
49	How do you deal with rodents and snakes that come in?		

50	Is there fly mesh on windows & doors?	0 = No 1 = Yes	
51	What do you do in case of fire?		
52	What do you do in case of electric failure?		
53	What do you do in case of water pressure failure?		
54	What do you do in case of overheating?		
55	How close to the poultry house is the generator placed?	0 = very close 1 = reasonable distance 2 = far away	

Section: Quality control

56	What SOP are you following?		
57	Which standard record books do you keep?	1 = Venkateshwara 2 = NECC 3 = other company, specify:	
58	What associations are you a member off?	0 = none 1= Yes, i. e.	
59	Is your farm registered under a quality assurance program, which one?		
60	What external health checks took place in your farm over the past two years?		
61	By what agencies?		
62	How often?		
63	Provision of laboratory	0 = external 1 = in-house	
64	Where do you get your feed?	0 = own feed mill (mixed on farm) 1 = simple local feed mill 2 = feed mill with quality control system	
65	Do you supply to egg-powder manufacturing units?	0 = no 1 = yes	
66	If yes, what quantity during last year?	No of eggs	
67	Is your unit contracted out with any larger company or unit?	0 = no 1 = yes If yes, specify:	
68	What is your main market?	name	
69	What proportion of eggs goes to what different markets? (%)	Whole-sale Retail Egg-powder production On-farm or institutional Others, i.e.	

70	Distance of farm from main market	Kilometres	
71	How old is the unit?	Years	
72	What major problems did you face over the past 5 years?		
73	What recent improvements have been made in animal health care?		

74 - Stockman / animal interaction questionnaire

(ask following questions to caretaker)

How often do you:

a.	Talk to the birds when walking through the flock	never	sometimes	often	always
b.	Do you give some signal to make birds aware before entering the animal house?	never	sometimes	often	always
c.	Feed whole grains manually (in the litter, in the feeder or out on range)	never	sometimes	often	always
d.	Pick up birds for control/inspection (mites, laying, feather pecking)	never	sometimes	often	always
[FREE RANGE ONLY]					
e.	Adjust your speed when walking through the flock (e.g. slow down when many birds are ahead and speed up when there is free space)	never	sometimes	often	always
f.	Stand still to give birds time to move away	never	sometimes	often	always
g.	Push birds in some way to move them	never	sometimes	often	always

Observations & measurements (presence of farmer/caretaker not required)

75 Air quality

How do you judge the atmosphere in the house?	0 = stuffy 1 = average 2 = fresh	
How strong is the ammonia smell?	0 = Strong 2 = average 3 = Low	

76 Space measurements / food water, litter observations

Is there a written report used of previous credible inspection which has measured available space?	0= No 1= Yes, type or authority: If yes, below details could be copied from the report. If not, please measure yourself.	
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77 Space: length and width of the Cages (FOR CAGES ONLY)

What brand and type of cages are used?	Brand: Type:	Usable area/ Cage (inch ²)	
What are the	Width		Stocking density:

dimensions of each cage? (inch)	Depth Height		Usable area / no of hens (inch ² /hen):
	Number of hens placed per cage		

78 Feed space per bird - FOR CAGES ONLY, other systems see Q.(Free Range Section)

Total length of feeder per cage (a)	
Number of birds placed / cage (b)	
Feeder access per bird (inches) = (a) / (b)	

79 Drinkers - Calculate ratio of drinker points/bird. - FOR CAGES ONLY, other systems see Q.

Number of nipple drinkers per cage (a)	
Number of birds placed per cage (b)	
Drinker ratio / bird (a/b)	

80 Behaviour

How comfortable is this flock?	0 = dull and depressed 1 = stressed/aggressive 2 = calm and easy	
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81 Clinical Scoring - Pick up animals for closer examination if necessary. Choose birds from different parts of the house

a. No of animals picked up:	
b. How would you characterize the feather cover of the birds:	0 = Many birds are almost completely naked 1 = Many birds have naked patches 2 = Most birds have damaged feathers, but not many have naked areas 3 = Many birds have damaged feathers, but hardly any naked patches are seen 4 = Majority of birds have undamaged feather 5 = Hardly any birds have damaged feathers

82 Clinical conditions: Estimate the proportion of birds with the following conditions:

	0= ≥25% of birds	1=>3 birds, <25% birds	2 = very few birds
a. Wounds on combs			
b. Wounds on toes			
c. Wounds on other body parts			
d. Foot pad problems			
e. Decoloured combs			
f. With eye pathologies			
g. With respiratory infections			
h. With enteritis			

i. With toe damage			
j. With comb abnormalities			
k. With enlarged crops			

83 Evidence of red mites

In what extent do you see evidence of red mite infestation?	0 = No red mites detectable on birds and in the house 1 = Red mites found on birds or in the house, but not in large quantities and not clearly visible 2 = Large quantities of red mites found on birds and/or in the house	
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84 Parasites (other than red mites)

a.	Is there any evidence of parasites?	0 = No 1 = Yes	
b.	What types?		

85 RECORDS (observe record book of particular flock)

	What records are available? 0 = not available, 1 = available What records are kept up-to-date? 0 = not, 1 = partly, 2 = fully	av	up to date
a.	Medicine records: - medicines used - date treatment started and finished - dose used, - expiry date - withdrawal period		
b.	Vaccination records - schedule / protocol - vaccine & dose used - date of vaccination - expiry date - withdrawal period		
c.	Veterinary reports and diagnoses, post mortem results, bacteriology results		
d.	Records of staff training		
e.	Cleaning and disinfection protocols		
f.	Data sheets for disinfection and cleaning products		
g.	Water quality testing records		
h.	Waste disposal records		
i.	Emergency procedure protocols in case of emergency		
j.	House temperature records		
k.	Mortality records		
l.	Culling records		
m.	Pullet transport sheets		
n.	Production sheets		
o.	Feed ingredient sheets		
p.	Feed delivery records		
	Total number of records maintained		

86 Mortality - From a recently completed flock cycle, calculate the mortality percentage from the house records Not asked for each age, but available on recoding sheets of farm total mortality was around 8%

Brooders

Number of birds placed in house (A)	
Total number of birds which died during the flock cycle (B). (not including culled birds)	
Percent Mortality (B/A) x 100	
Total number of birds which were culled during the flock cycle (C).	
Percent Culled (C/A) x 100	
Total number of hens left (D=A-B-C)	
Percentage of hens dead or culled (D/A*100%)	

Growers

Number of birds placed in house (A)	
Total number of birds which died during the flock cycle (B). (not including culled birds)	
Percent Mortality (B/A) x 100	
Total number of birds which were culled during the flock cycle (C).	
Percent Culled (C/A) x 100	
Total number of hens left (D=A-B-C)	
Percentage of hens dead or culled (D/A*100%)	

Layers

Number of birds placed in house (A)	
Total number of birds which died during the flock cycle (B). (not including culled birds)	
Percent Mortality (B/A) x 100	
Total number of birds which were culled during the flock cycle (C)	
Percent Culled (C/A) x 100	
Total number of hens left (D=A-B-C)	
Percentage of hens dead or culled (D/A*100%)	

87 Egg production

a. Are second grade eggs kept apart from first grade eggs?	0 = Put in same trays 1 = Put in separate trays, in same containers/ truck	
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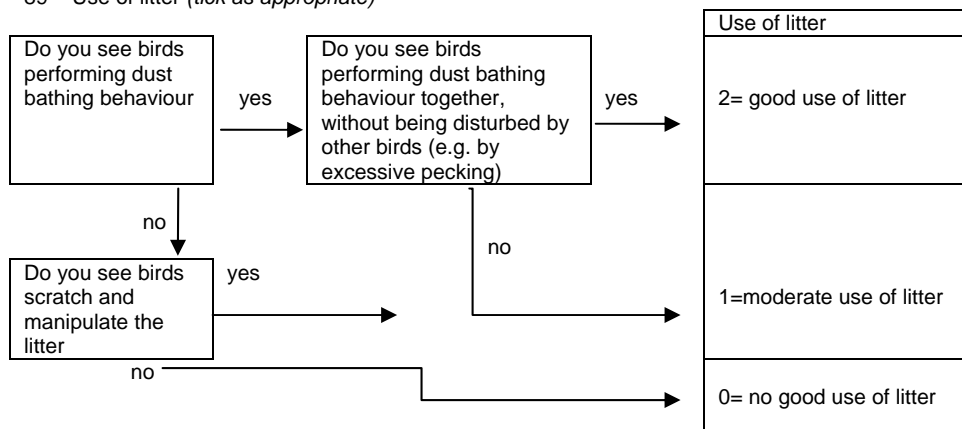
	2 = Put in separate containers	
b. Is there any coding system for the eggs to indicate production method or farm?	0 = no 1 = yes → please indicate what coding:	
c. What is done with dirty eggs	0 = not cleaned, included with other eggs 1 = cleaned and included with other eggs 2 = cleaned, treated and included with other eggs 3 = sold separately	

FREE RANGE ONLY

88 Perforated floors - Indicate the % of total space covered with perforated floors and describe the type / style of perforated flooring material

Total % of usable area covered with perforated floor (estimate)		
Type / style of perforated floor	0 = wire mesh 1 = plastic wire 2 = wooden slats	

89 Use of litter (tick as appropriate)



90 Litter

A	Has any additional litter material been put in this house during this flock cycle?	0 = no 1 = yes	
b.	Has any litter material been removed during this flock cycle?	0 = no 1 = yes	

c.	What is the litter material type in the house?	1 = whole straw 2 = chopped straw 3 = wood shavings 4 = mixture of wood shaving and straw 5 = saw dust 6 = paper 7 = hemp 8 = rice husks 9 = peat 10 = earth 11 = other, i.e.	
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91 Perches - Count all perches, e.g. on A-frames, in multi-tier systems or in cages (don't count perches in areas that are not available permanently / that birds cannot access (including corners))

Length of one perch (A)	Number of perches (B)	Total perch length C = A * B	Number of birds placed (D)	Perch length per bird (cm) (C/D)

92 Shape and position of perches:

Shape in cross section	0 - No presence of sharp edges on perch 1 - Presence of sharp edges on perch	
Presence of a resting zone (with perches, but no feeders)	0 – over 50% of perch length is positioned in a resting zone 1 – 0-50% of perch length is positioned in a resting zone	

93 Use of nest boxes

Are there nest boxes?	0= no / 1= yes	
If yes, what type?	0 = litter nest 1 = roll-away nest box	
Are the nests evenly spaced throughout the system?	0= no / 1= yes	

Single nest – calculate number of birds per nest.

Total number of nests	Number of birds placed	Bird: nest ratio

Group nest – calculate available nest box area per bird.

Number of nests	Nest area per nest (m ²)	Number of birds placed	Birds / m ² of nest area

94 Feeders

a. Number of pan feeders	
b. Circumference of pan feeders (cm)	
c. Number of birds placed	
d. Total feeder access length (cm) = a * b	
Cm feeder access per bird = d / c	

e. Total length of double sided track feeder	
f. Total length of single sided track feeder	
Cm feeder access per bird = (2*e + f) / c	

95 Drinkers - Calculate the length of water trough per bird or ratio of drinker points/bird.

a. Number of bell drinkers	
b. Circumference of bell drinkers (cm)	
c. Number of birds placed	
Cm drinker access per bird = (a * b) / c	

d. Number of nipple drinkers	
e. Number of cup drinkers	
Drinker ratio / bird (d + e) / c	

96 Space: measure the length and width of the house. Calculate the stocking density using data collected at the beginning of the audit

Overall litter floor area (feet ²) (L)	Overall usable non-litter floor area (Feet ²) (W)	Total usable area (feet ²) (L + W)=(U)	Number of birds placed (N)	Stocking density: birds/ Feet ² usable area (B / U)

97 Enrichment measures

	0 = Not available or none of the birds are using it	1= Less than 50% of the birds are using it	2= Between 50% and 100% of the birds are using it
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Enrichments (e.g. hanging ropes, bales of hay, partitions, roofs in free range area)			
Free range			
Covered veranda			

98 Observation of interaction between caretaker & animals during routine activities

Interaction:	<i>(skip if no observation can be made)</i>	
a. Gentle vocal interactions (softly talking to animals)	never 1 _____ 10 often occurred	occurred
b. Gentle interactions tactile (gently touching)	never 1 _____ 10 often occurred	occurred
c. Aversive interactions (kicking, shouting)	never 1 _____ 10 often occurred	occurred
d. Intermediate interactions (pushing animals away with feet with low force)	never 1 _____ 10 often occurred	occurred
e. Carefulness / suddenness of movements	always 1 _____ 10 often careful	makes sudden movements

99 Character of the flock

How would you characterize this flock?	0 = This is a fearful, flighty flock 1 = The flock is not responding much to stimuli , they don't appear to be interested in their environment 2 = This is a calm and easy flock and they appear to be happy 3 = This is an easy flock that is not afraid of new people/things and that likes to investigate various stimuli
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100 Fearfulness of the birds

a. When you enter the house, how do the birds react?	0 = They are scared and fly/run to the other end of the house 1 = They hardly react 2 = They come towards the door
b. When you approach the birds, how do they react?	0 = They are scared and fly away 1 = They stay at a certain distance 2 = They come towards you, sit on your shoulder, peck your boots
c. When you walk through the house, how do the birds react?	0 = They are scared and fly away 1 = They don't move 2 = They follow you



Wageningen UR Livestock Research

Edelhertweg 15, 8219 PH Lelystad T 0320 238238 F 0320 238050

E info.livestockresearch@wur.nl | www.livestockresearch.wur.nl