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Report 193

## Dairy Sector Development Indonesia Options for cooperation with The Netherlands

April 2009



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## Rapport 193

# Dairy Sector Development Indonesia Options for cooperation with The Netherlands

A.P. Wouters

April 2009

## Colofon

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## Abstract

The dairy supply chain in Indonesia is described with its limitations and options for improvements. An integrated and participative approach with the dairy cooperatives as entry point is proposed to improve milk production at farm level. The Netherlands could contribute via development of business relations and development projects.

## Keywords

Indonesia, development, dairy sector, dairy chain development, cooperatives, Netherlands, agri-business

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## Samenvatting

De zuivelketen in Indonesië is beschreven met haar beperkingen en opties voor verbetering. Een geïntegreerde en participatieve aanpak met de zuivelcoöperaties als ingang wordt voorgesteld om de melkproductie te verbeteren. Nederland kan daarbij een rol spelen door ontwikkeling van zakelijke relaties en ontwikkelingsprojecten.

## Trefwoorden

Indonesië, ontwikkeling melkveehouderij, zuivelketen, coöperaties, Nederland, agri-business

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Bram Wouters  
Lelystad, February 2009

## Abbreviations

AI	Artificial insemination
asl	above sea level
CBAT	Turkish Animal Breeding Association
DG	Directorate General
EU	European Union
GKSI	General Dairy Cooperative Indonesia
Gol	Government of Indonesia
HF	Holstein Friesian
IAARD	Indonesian Agency for Agricultural Research and Development
ICARD	Indonesian Centre for Animal Research and Development
IDR	Indonesian Rupiah
IMF	International Monetary Fund
IPB	Bogor Agricultural University
IPS	Indonesian Association of Dairy Processors
JICA	Japan International Cooperation Agency
KPBSU	Bandung Northern Dairy Farmer Cooperative
KUD	Primary cooperative
MoA	Ministry of Agriculture
PSOM	Programma Samenwerking Opkomende Markten
PTC+	Praktijk en Training Centrum Nederland
SNI	Indonesia National Standards
TPC	Total Plate Count
TS	Total Solids
USA	United States of America
USDA	United States Department of Agriculture
UHT	Ultra Heat Treatment
Wageningen UR	Wageningen University and Research Centre
WB	World Bank

## Samenvatting

De eetpatronen van Indonesische huishoudens veranderen zoals in veel Zuidoost Aziatische landen. Een belangrijke verandering is de toename in consumptie van dierlijke eiwitten in de vorm van pluimvee- en zuivelproducten. De aandacht van Indonesische overheid en bedrijfsleven voor de ontwikkeling van de lokale zuivelsector is versterkt door de groeiende vraag naar dierlijk eiwit, de problemen met vogelgriep en de hoge wereldmarktprijzen voor melkproducten in 2007.

Het doel van de studie was het identificeren van opties voor het stimuleren van de ontwikkeling van de Indonesische zuivelsector en kansen voor Nederland om bij te dragen aan de ontwikkeling van deze sector. De studie is uitgevoerd in het laatste kwartaal van 2008 door middel van literatuurstudie, gevolgd door interviews en gesprekken met belanghebbenden in Indonesië (West Java). Belanghebbenden waren onder anderen vertegenwoordigers van het Ministerie van Landbouw, zuivelindustrie, melkveehouders, universiteiten, onderzoek- en opleidingsinstituten, dienstverleners en toeleveranciers. Dit rapport is het resultaat van de studie en geeft een overzicht van de macro situatie van de zuivelsector, het overheidsbeleid met betrekking tot de sector, een analyse van de zuivelketen, haar beperkingen en mogelijke oplossingen en de kansen voor samenwerking met Nederland.

De lokale melkproductie in Indonesië is voornamelijk geconcentreerd in de hoger gelegen gebieden van het eiland Java. Er is een interesse van de overheid en de private sector (zuivelindustrie) om de lokale melkproductie te stimuleren. Elkaar beconcurrerende claims (*competing claims*) wat betreft grondgebruik en de klimatologische omstandigheden in het laagland beperken de uitbreiding van de melkproductie op het eiland Java. De trend naar grotere melkveehouderijbedrijven zal bijdragen aan de verhoging van de melkproductie, maar het grootste deel van de melk zal ook in de toekomst geproduceerd worden door de kleinschalige melkveehouderij. Het verhogen van de melkproductie per koe door verbetering van de bedrijfsvoering, betere levering van diensten en inputs en de verhoging van de efficiëntie van de zuivelketen (met als resultaat een hogere melkprijs voor de veehouders) zijn sleutels tot het verhogen van de melkproductie.

De lokale melkproductie kan ook worden verhoogd door uitbreiding van de melkveehouderij op (West-) Sumatra en Sulawesi en eventueel andere delen van Indonesië, maar de verwerking en de afzet zal tegelijkertijd moeten worden ontwikkeld om succesvol te kunnen zijn. Het beleid gericht op decentralisatie van de overheid zal waarschijnlijk leiden tot meer lokale initiatieven ter stimulering van de zuivelontwikkeling.

Het overheidsbeleid is erop gericht om de zelfvoorzieningsgraad in zuivelproducten te verhogen van de huidige 30% naar 50% in 2015. Kleinschalige melkveehouderij leidt ook tot inkomensverbetering op het platteland en stimuleert de werkgelegenheid, belangrijke doelstellingen van het overheidsbeleid. Het overheidsbeleid gericht op de primaire producenten heeft als doelstellingen: het verhogen van de productie per koe (verhoging van de melkproductie van de huidige 8-10 kg tot 15 kg per koe per dag), verbetering van de kwaliteit van de boerderijmelk en een melkprijs voor de veehouder op een niveau van tenminste 80% van de melkprijs op de wereldmarkt. De overheid stimuleert ook de vorming van producentengroepen en groepsactiviteiten door middel van subsidies. Daarnaast streeft de overheid naar uitbreiding van de melkproductie in de gebieden buiten Java.

De belangrijkste actoren in de Indonesische zuivelketen zijn de melkveehouders (vooral kleinschalige melkveehouders), de primaire en secundaire (zuivel) coöperaties (melkcollectie, diensten en toelevering), de zuivelindustrie, de overheid en de dienstverlenende en toeleverende industrie en instanties.

Kleinschalige melkveehouders in de hooglanden van Java produceren het grootste deel van de melk. Melkproductie op grootschalige of megabedrijven is beperkt. De rendabiliteit van de melkveehouderij is verbeterd door de stijging van de melkprijs af boerderij in 2007, maar dreigt weer te verslechteren in 2009 door de lage wereldmarktprijzen voor zuivel.

Veel van de problemen op de kleinschalige bedrijven houden verband met voeding. Meer land voor voerproductie (teelt van voedergewassen in bossen, plantages), een betere benutting van het beschikbare voer, krachtvoer van betere kwaliteit en verhoging van het kennisniveau kunnen zorgen voor betere randvoorwaarden voor het verhogen van de melkproductie. Gebrek aan kwalitatief goed jongvee beperkt de mogelijkheden voor selectie. Goede jongvee opfok op de bedrijven en/of centrale jongvee opfok zal de mogelijkheden voor vervanging verbeteren. Nieuwe innovaties met betrekking tot huisvesting kunnen meewerken aan het verbeteren van het dierenwelzijn en de melkkwaliteit (betere hygiëne).

De overheid en een aantal coöperaties bieden ondersteunende diensten aan. Twee KI stations op Java leveren sperma aan KI diensten van de overheid, coöperaties en aan particuliere boeren. Er is een begin gemaakt met het testen van fokwaarde. Opleidingscentra van de overheid organiseren cursussen voor voorlichters en boeren,

terwijl overheid en coöperaties ook veehouders adviseren. Voorlichtingsprogramma's met groepsmethoden en voorbeeld bedrijven (*key farms*) hebben in voorgaande projecten tot positieve resultaten geleid.

Coöperaties in handen van boeren assisteren melkveehouders door middel van de inzameling en verkoop van melk aan de verwerkende industrie, het leveren van veevoer, het verstrekken van krediet (voor veevoer, koeien) en diensten. Sommige coöperaties verwerken ook op kleine schaal melk en organiseren de afzet voor hun zuivelproducten. Coöperaties vormen een goede ingang voor het verbeteren van de melkveehouderij vanwege hun directe relatie met de veehouders. Management competenties van veel coöperaties moeten echter worden versterkt. De overkoepelende zuivelcoöperatie GKSI (die de primaire zuivelcoöperaties vertegenwoordigt) biedt een indirect platform voor de veehouders om te onderhandelen met de zuivelindustrie.

De zuivelindustrie wordt gedomineerd door een aantal relatief grote spelers: Frisian Flag/Foremost (FrieslandCampina), IndoMilk/Indolacto en UltraJaya (allen met fabrieken op West Java) en Nestlé Indonesië (Oost Java). Er zijn lage heffingen op de invoer van zuivelproducten. Het grootste probleem voor de verwerking van lokaal geproduceerde melk is de slechte kwaliteit van de boerderijmelk. Het uitbetalen van melk naar kwaliteit (samenstelling en kiemgetal) stimuleert met name de coöperaties om de kwaliteit van de melk te verbeteren maar nog te weinig de individuele producenten. Verscheidene zuivelfabrikanten bieden assistentie aan coöperaties en hun leden ter verbetering van de melkkwaliteit en melkproductie.

De ondoelmatigheden in de zuivelketen komen tot uiting in relatief grote verschillen in melkprijs voor de veehouder en de consumentenprijzen van zuivelproducten. Consumenten kopen vooral zuivelproducten met een lange houdbaarheid (melkpoeder, gecondenseerde melk, UHT-melk), maar het gebruik van gekoelde "vers" producten zoals gepasteuriseerde melk en yoghurt producten neemt toe en zal waarschijnlijk verder toenemen met stijgende inkomens (meer koelmogelijkheden op huishoudniveau en verandering van eetpatroon). Belangrijke factoren die van invloed zijn op de ontwikkeling van de lokale zuivelketen zijn o.a. de afhankelijkheid van geïmporteerde melkpoeder, sterk fluctuerende prijzen op de wereldmarkt, het ontbreken van bescherming tegen prijsschommelingen op de wereldmarkt voor de lokale melkproducenten, de omvang en structuur van de melkveehouderij en de slechte kwaliteit van de boerderij melk. Mogelijke oplossingen om de lokale melkproductie en de winstgevendheid te verhogen dienen zich te richten op verbetering van de bedrijfsvoering met name voeding. Daarvoor is een geïntegreerde benadering nodig waaraan zuivelindustrie, veevoerbedrijven, zuivelcoöperaties, veehouders, overheid en kennisinstellingen deelnemen. De overheid kan bijdragen aan de verbetering van de winstgevendheid door middel van subsidies, fiscaal beleid, betere dienstverlening en het verbeteren van de beschikbaarheid van land voor voerproductie. Verhogen van de melkproductie buiten Java vraagt om steun van de overheid bij het ingang zetten van de ontwikkeling. Het toevoegen van meer waarde aan de melk door middel van lokale verwerking en afzet door veehouders of coöperaties is een andere optie om de winstgevendheid voor de veehouder te vergroten. De toepassing van internationaal aanvaarde kwaliteitsnormen zal echter meer inspanningen vergen van kleine bedrijven, terwijl de overheid meer aandacht zal moeten besteden aan de uitvoering en handhaving van de kwaliteitsnormen in verband met de voedselveiligheid.

Nederland heeft een lange traditie in de melkveehouderij en kan bijdragen leveren aan de ontwikkeling van zuivelketen in Indonesië door middel van expertise, knowhow en via het agrarisch bedrijfsleven. De Indonesische overheid toont interesse in de verdere ontwikkeling van de zuivelsector, terwijl de marktperspectieven en vooruitzichten op de lange termijn goed zijn en de winstgevendheid op boerderijniveau onlangs is verbeterd. Nederland kan bijdragen door het versterken van de zakenrelaties op het gebied van de zuivelontwikkeling en door middel van steun aan ontwikkelingsprojecten of een combinatie van beiden. Kansen voor de ontwikkeling van zakelijke relaties liggen op het gebied van fokkerij (sperma, embryo's), veevoer (premixen voor krachtvoer, melkvervangers voor kalveren), melkkoelapparatuur en commerciële consultancydiensten (met name voor grootschalige bedrijven). Ontwikkelingsprojecten met als doel het versterken van de kleinschalige melkveehouderij en de zuivelketen kunnen zich het beste richten op het werken met goed geleide coöperaties waarbij ook belangrijke belanghebbenden zoals de (lokale) overheid en kennisinstellingen bij de uitvoering worden betrokken. Een participatieve aanpak door het werken met groepen boeren met een focus op de invoering en het testen van nieuwe innovaties kan een stimulans vormen voor boeren en een voorbeeld voor andere coöperaties. Samenwerking met het Nederlandse bedrijfsleven dat voor een deel al in Indonesië actief is (zoals zuivel- en veevoerindustrie) voor het verkennen van en het testen van nieuwe innovaties (voer) kunnen in dergelijke projecten tegelijkertijd de zakelijke relaties versterken. Als optie is in het rapport een voorstel opgenomen voor een geïntegreerde aanpak voor verbeteren van melkveehouderij op West Java. Een andere optie zou kunnen zijn om de melkproductie buiten Java te stimuleren, maar daarvoor dient eerst een meer gedetailleerde haalbaarheidsstudie te worden uitgevoerd.

## Summary

The diets of Indonesian households are changing like in many Southeast Asian countries. A major change is the increased consumption of animal proteins in the form of poultry and milk products. The growing demand for animal protein, the problems with avian influenza, and the high world market prices for dairy products in 2007 results in more attention of the Indonesian government and the dairy industry for the development of the local dairy sector.

The objective of the study was to identify development options for the Indonesian dairy sector and opportunities for The Netherlands to contribute to this development. The study was conducted by means of a literature study followed by interviews and discussions with stakeholders in Indonesia (West Java) during a fact finding mission in the last quarter of 2008. Stakeholders included representatives of the Ministry of Agriculture, dairy industry, farmers, knowledge institutions, service providers and input suppliers. The report presents an overview of the macro situation of the dairy sector, major government policies in relation to the sector, an analysis of the dairy supply chain, its limitations and possible solutions and options for cooperation with The Netherlands.

The local milk production in Indonesia is mainly concentrated in the higher altitude areas of the island of Java. There is an interest of the government and the private sector (dairy industry) to stimulate local milk production. Competing claims for land and climatic conditions in the lower altitude areas limit expansion of milk production at Java. The trend to establish large scale dairy farms will contribute to the increase of milk production, but also in future the bulk of the milk will be produced by smallholders. Increase of milk production per cow by improved farm management practices, increased efficiency of the dairy supply chain (which should result in higher farm gate milk prices), and improved provision of services and inputs to farmers are key factors in increasing milk production on small scale farms. Local milk production could also be increased by expansion of dairy farming on West Sumatra and Sulawesi and/or in other parts of Indonesia. Processing and marketing would need to be developed at the same time for this to be successful. Decentralization of government will probably lead to more local initiatives to stimulate dairy development.

Government policy is directed to increase self-sufficiency in milk products from the current 30% to 50% by 2015. Small-scale dairy farming that leads to improved incomes and employment opportunities in the rural areas also meet important objectives of government policy. Government policy directed at the primary producers aims at improvement of production levels per cow (milk production per cow per day to increase from the present 8-10 kg to 15 kg per cow per day), improvement of raw milk quality and a minimum farm gate milk price to be at least 80% of the world market price. To achieve this, the government stimulates among others farmer group formation and group activities by means of subsidies. The government aims also at an expansion of milk production in areas outside Java.

Main actors in the dairy supply chain in Indonesia are the dairy farmers (mainly smallholders), primary and secondary dairy cooperatives (main activities: milk collection and transport, service and input supply), milk processors, the government, and private service and input suppliers.

Profitability of dairy farming has improved because of the rise in farm gate milk prices in 2007 but tends to decrease in 2009 because of the low world market prices for dairy products. Many of the managerial problems at the small scale farms are related to feeding. Increased availability of land for forage production (growing of forage in forests, plantations), better utilization of available forage, better quality concentrate feeds, and improvement of farmer's knowledge will provide better conditions for milk production. Lack of good quality young stock limits the opportunities for selection. Rearing of young stock at the farms or on farms with central young stock rearing will improve availability of replacement heifers. New innovations regarding housing could improve animal welfare and milk quality (hygiene).

Service and input supply to farmers is offered by the government and a number of dairy cooperatives. Two AI stations at Java supply semen to government services, cooperatives and private farmers. A start has been made with a progeny testing scheme. Government training centers offer courses for extension staff and farmers. Government and cooperatives offer advice to farmers. Extension projects with group approaches and key farmers gave positive results.

Dairy cooperatives owned by farmers assist dairy farmers by means of collection and sales of milk to the milk processing industry and by providing feeds, credit (for feed, cows etc) and services to farmers. Some cooperatives have engaged in small scale processing and marketing of dairy products. Dairy cooperatives are a good entry point for improvement of dairy farming practices, because of their direct relation with farmers.



Management competences of many cooperatives however need to be strengthened. The overall dairy cooperative GKSI offers an indirect platform for farmers to negotiate with the dairy industry.

The dairy industry is dominated by a number of large players: Frisian Flag/Foremost, IndoMilk/Indolacto and UltraJaya (all with dairy plants at West Java) and Nestle (with a plant at East Java). Current government policy imposes limited levies on importation of dairy products. The poor raw milk quality is a major problem for the use of locally produced milk by the dairy industry. Milk payment schemes according to quality (total solids and total plate count) stimulate cooperatives to improve milk quality, but as yet insufficiently at farm level. The dairy industry provides (technical) assistance to a number of cooperatives and their members to improve milk quality and milk production.

The inefficiencies in the dairy supply chain are reflected in a relatively large difference between farm gate milk price and consumer prices of milk products. Consumers buy mostly dairy products with a long shelf life (milk powder, sweetened condensed milk, UHT milk), but consumption of cooled “fresh” milk products (cold chain products) like pasteurized milk and yoghurt products increases and is likely to increase with increasing incomes (more refrigerators at household level and changing consumption patterns).

Factors like the dependency on imported milk powder and the strongly fluctuating world market prices, the lack of protection against world market fluctuations for the local milk producers, the scale and structure of dairy farming, and poor raw milk quality affect the development of the dairy supply chain. Possible solutions to increase local milk production and farm profitability should focus on improvement of farm management practices, particularly on feeding. An integrated approach in which dairy and feed industry, dairy cooperatives and farmers take part is required. The government could support improvement of profitability by means of subsidies, tax policies, improved services, and facilitating the availability of land for forage production. Increase of milk production outside Java will need government support in the initial stages. Adding more value to milk by means of local processing and marketing by farmers groups or cooperatives is another option to increase profitability. However, the application of internationally accepted food quality standards will require more efforts from these small plants, while the government will need to pay more attention to implementation and enforcement of food safety standards.

The Netherlands has a long tradition in dairy farming and could contribute by means of expertise, know-how and agri-business to the development of the dairy supply chain in Indonesia. The government of Indonesia shows interest in further development of the dairy sector, while market prospects in the long term are good and profitability at farm level has improved recently. The Netherlands could contribute by strengthening of business relations and by means of development projects with technical assistance and/or a combination of both. Business relations could develop in the areas of animal genetics (semen, embryos), feeds (pre-mixes for concentrates, milk replacer for calves), milk cooling equipment, and commercial consultancy services (especially for large scale farm operations). Development cooperation programs aiming at improvement of dairy farming and the dairy supply chain should focus on working with well-managed cooperatives with involvement of important stakeholders like government (Ministry of Agriculture), local governments, knowledge institutions and agri-business. A participatory approach by working with farmers groups and with a focus on introduction and testing of new innovations could stimulate farmers to improve their management and provide examples for other cooperatives. Cooperation with Netherlands agri-business for exploring and testing new innovations (for example feed) could at the same time strengthen business relations. As a possible option, a proposal is presented in this report for an integrated dairy development program at West Java. Another option could be to support the dairy production outside Java, but a more detailed feasibility study should be conducted first.

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## Acknowledgements

## Abbreviations

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# 1 Introduction

Indonesian household diets are changing like in many other South East Asian countries. The main general characteristic of this westernization of the diets is: the decrease in consumption of rice (Indonesia's main staple food), an increased consumption of wheat and wheat-based products, and a rise in high protein-diets derived from animal products (Fabiosa, 2005). Fish is the main source of animal protein, but the proportion of poultry and dairy products in the diet is increasing relatively rapidly. Beef consumption shows a relatively smaller increase. The current per capita consumption of dairy products is very low compared to European standards, but also low compared to consumption in neighboring countries like Malaysia, Vietnam etc. 70% of the dairy products are consumed in the urban areas of Java (Fabiosa, 2005). Consumption of milk products shows a steady growth and is expected to grow with 6% per year in 2008 rising to a per capita milk consumption of 7.7 kg per person per year of which fluid milk consumption is estimated to only 1.4 kg per person per year. The major consumer products are milk powder, sweetened condensed and liquid milk (Meylinh, 2007). Reconstitution of milk powder or consumption of dairy products with a long shelf life (condensed milk, UHT milk) is common practice, as refrigeration facilities are limited. All major dairy plants in Indonesia are located on the island of Java. Access to fresh dairy products outside Java is limited.

The growing demand for animal protein, the avian influenza problems with poultry, and the high world market prices for dairy products in 2007 has drawn more attention of the dairy industry and Indonesian government to the development of the local dairy sector.

The objective of this study was to identify the development options for the Indonesian dairy sector and opportunities for The Netherlands to contribute to this development. The Netherlands has a well developed dairy industry with an efficiently operating dairy supply chain and specialized dairy farms with a high milk production per cow. The experiences and knowledge of the Netherlands dairy chain could be valuable for the further development of the Indonesian dairy sector. This could offer also business opportunities for the Netherlands agribusiness and knowledge institutions.

The study was conducted during the last quarter of 2008. A short literature study was followed by a fact finding mission in December 2008. During the fact finding mission at West Java, discussions were held with several experts and stakeholders: Ministry of Agriculture (Directorate of Ruminant Farming), Department of Animal Production and Technology of Bogor Agricultural University (IPB), Research and Empowerment Institute of Bogor Agricultural University, Indonesian Center for Animal Research and Development ICARD (part of Indonesian Agency for Agricultural Research and Development (IAARD)) in Bogor, dairy industry (Frisian Flag), AI station Lembang, Dairy Cooperative KPBSU in Lembang, Dairy Training Institute in Lembang, JICA Dairy Cattle Disease Project, dairy farmers, farm advisors, and feed industry (Trouw Nutrition).

This report is the result of the study and first presents a state of the art regarding the dairy sector and trends for the future (chapter 2). In chapter 3 a summary is given of the government policy regarding dairy development while in chapter 4 the dairy supply chain with its limitations and options for improvement is described. In the final chapter (chapter 5) possible options for cooperation with The Netherlands are proposed.

## 2 Macro situation of the dairy sector

### 2.1 History and present situation

For many decades, supply of milk and milk products in Indonesia was depending on import of milk powder. Except for small milk producing pockets at Java and Sumatra, there was hardly any local milk production. Local milk production (at Java) was initiated during the 70's of last century by the government with assistance of World Bank and bilateral donors. Large importation of cattle (Holstein Friesians) from Australia were accompanied by protective measures to stimulate local milk production. Dairy processors had to blend dairy imports (milk powder) with locally produced milk at rates up to 1:2. These measures worked out favorably for the local milk producers and local milk production increased, particularly in the areas suitable for dairy farming (above 700 m a.s.l.). Three milk producing areas developed on Java : West Java (area around Bandung, Bogor), East Java (area around Malang) and in the highlands of Central Java. Milk producers linked up with the existing dairy processors in those areas.

Dairy cooperatives were introduced by the government to link milk producers with milk processors and to provide farmers with services and inputs. Consumer prices however were relatively high. After the Asian financial and economic crisis in 1997, the IMF readjustment program forced the government to lift the protective measures for the local milk producers. Since that time, the dairy farmers had to adjust to lower prices as milk prices for locally produced milk are maintained at a lower level than world market prices (imported milk powder). Local milk production did not decline but growth was limited. In 2007, prices of milk powder on the world market soared and milk prices paid to the local farmers were increased. At the moment (2009), milk prices for farmers are higher than world market prices.

In 2007, Indonesia's fresh marketed milk production was about 1.2 million liters per day amounting to about 0.45 million ton per year. This amount meets only 25-30% of the dairy needs, the remainder is imported. Imports are mainly obtained from Oceania (Australia, New Zealand), EU and USA (Meylinah, 2007).

As mentioned before, milk production is largely concentrated in three milk-producing pockets on the island of Java. East Java's dairy farmers produce the highest amounts (approximately 600,000 l/day) followed by West Java ( about 400,000 l/day). The remainder (about 200,000 l/day) is produced in Central Java and other parts of Indonesia (Meylinah, 2007). Milk is produced mainly by small holders, most of them organized in dairy cooperatives (about 90 cooperatives with 118,000 dairy farmers). These 118,000 households have on average 3 cows and provide employment to 360,000 people (Toharmat et al., 2007). Average milk production per cow varies per region. Milk production per cow is estimated to be the highest in East Java (about 11 kg per cow per day) and 7 kg per cow per day in Central and West Java (Toharmat et al., 2007). There are only few large scale dairy operations at Java with more than 100 cows. Most of them integrate milk production with on-farm processing and own marketing of milk and milk products.

Improvements of productivity and milk quality are hampered by factors like: scale of operation (small farms), low level of farmer education, poor farming practices, insufficient incentives for farmers, lack of hygiene and poor handling of the raw milk, lack of access to improved genetics and feeds, relatively high feed costs and unfavorable weather conditions (Meylinah, 2007, Fabiosa, 2005).

From the start of dairy development in the 70's, milk collection has been organized by cooperatives. At a later stage (1995), the overall cooperative (GKSI) was established to care for cooling, transport and marketing. The primary dairy cooperatives are member of GKSI. Basic milk prices are negotiated and determined between the Association of Dairy Processors (IPS) and the GKSI. A common basic milk price has advantages for less attractive areas (areas far away from the processing facilities). Nowadays, most dairy cooperatives make direct contracts with dairy processors in their area.

Milk quality is low and hygienic quality measured by TPC (total plate count) ranges from 0.5 to 1 million cfu/ml (Meylinah, 2007, 2008). During the first phase of dairy development less attention was paid to raw milk quality. Because of the regulation to mix locally produced milk with imported milk powder, milk processors needed all the milk they could source. However, during the last decade, the large milk processors started to assist dairy cooperatives with improving raw milk quality and milk production.

## 2.2 Future trends

It is expected that because of the growing world wide demand for dairy products, world market prices for dairy products (particularly milk powder) will fluctuate much more in the future than during the last decades. Income growth in China and the South East Asian region will result in an increasing demand for milk and milk products if the effect of the present financial and economic crisis will not last too long. This also applies to the emerging markets in Eastern Europe, Turkey, Russia and South America. This world wide demand can be met only partly by the traditional milk producing areas (EU, USA and Oceania). As shown in 2007, a severe drought in Australia in combination with increasing worldwide demand can lead to strong fluctuations in world market prices for milk powder. Milk processors show an increasing interest in developing a base for local milk supply at fair costs, while national governments aim at higher rates of self sufficiency to protect consumers from unwanted price fluctuations. High food prices in 2007 have led to food shortages and unrest in many countries.

Indonesia's milk consumption per capita is one of the lowest in South East Asia. Reasons are among others the traditional very low consumption levels, the relatively high prices for dairy products and the concentration of the organized dairy industry on Java only. Next to aiming for a higher level of self sufficiency, reasons for the government to stimulate milk consumption and production are: better nutrition, particularly of young children, creation of income generating activities with a higher added value and a more regular income than food crop production, and creation of additional employment opportunities (at the farm but also in other parts of the dairy supply chain). Small scale dairy farming contributes to improvement of livelihoods in the rural areas and as a result could contribute to lower urban migration.

So far dairy development has taken place in the higher altitude areas on small scale dairy farms where heat stress is relatively low and high producing breeds like purebred Holstein Friesians could be kept. At Java, these areas are limited and dairy production has to compete for land with other activities which generate a high added value like horticulture. The Lembang area is a clear example where farmers engaged in horticulture use the more productive soils in the valleys and forage is grown on the somewhat less productive slopes of the hills and along borders of terraces.

Outside Java, more land is available for dairy farming (for example highlands of West Sumatra, South Sulawesi). There "fresh" dairy products are not available or expensive because of lack of milk. Development of local milk production will need simultaneous development of processing and marketing facilities to become successful. In these areas combinations of large and small scale dairy farming linked with milk processing might be successful to accelerate dairy production. Some small scale initiatives have emerged.

Large scale dairy development initiated by businessmen or investment companies is still limited in Indonesia. The most explicit example is the Green Fields Farm in Malang (at an altitude of 1200 m a.s.l) which started in 1997 and is a joint venture of an Australian investment company and an Indonesian owned feed company. At present the farm has more than 2000 cows in milk confined in a loose housing system with high input management. Vertical integration of the whole chain is practiced. The high quality milk is directly processed and marketed. Other large farms with own milk processing include farms in West Java like Taurus, and a few farms on West and North Sumatra. An important limiting factor for development of large scale dairy farming is land availability. Some large scale farms contract local farmers to supply for example forage maize. Large scale dairy farms at Java could supplement the demand for milk but also in the future the bulk of the milk production at Java will most likely come from small holder farms.

Dairy development in the lowlands of Java is not likely to take off because of unfavorable climatic conditions and land shortages (competing claims). Heat stress will be too high for purebred cattle like Holstein Friesian which means that crossbreds (with lower productivity) would be needed.

As there is no protection for the local dairy sector (limited tariffs on dairy products), the dairy sector is world market dependent. Government policy is to maintain the minimum milk price paid to the farmer at 80% of the world market price. Relative low farm gate prices offered by the organized dairy industry will result in new initiatives to add more value to milk by farmers or cooperatives to shorten the dairy supply chain. This could result in more farm gate sales of raw milk (informal market) or local processing and marketing. After the financial crisis and the liberalization of the milk market in 1998, several small processors entered the market and this will probably continue while also some of the dairy cooperatives previously only collecting milk have started with milk processing. Government policy stimulates these developments, but at the same time has to safeguard food safety. The large scale processors carry out quality control according to international standards. Maintaining good quality standards will require more efforts from small scale operations while at the

same time it will require strict monitoring and control by food safety authorities. The current control and inspection of small scale processing facilities and raw milk quality seems to be insufficient in this respect.

Another factor affecting dairy development is the decentralization of the government. Provincial and local governments take more local development initiatives and are able to allocate (financial) resources on their own. An example is the establishment of local AI stations in several provinces. Besides the two large national AI centers, 14 local AI centers are being established or planned. Also allocation of funds and human resources for services to farmers (extension, AI, animal health) will be decided more at local level.

Summarizing, there is an interest of the government and the private sector (milk processors) to stimulate local milk production. Decentralization of government will probably lead to more local initiatives to stimulate dairy development. Competing claims for land and climatic conditions in the low land limit expansion of milk production at Java. The trend to establish large scale dairy farms will contribute to an increase of milk supply but also in the future the bulk is likely to be produced by small holders. Increase of milk production per cow by improvement of farm management, increased efficiency of the milk supply chain (so that farmers obtain a higher milk price) and services to the farmers are the key to increase milk production on small scale farms at Java. Local milk production could still be increased by expansion of dairy farming to other areas of Indonesia like (West) Sumatra and Sulawesi but will be successful only if processing and marketing is developed at the same time.



Forage production (grass and shrubs) in forest area in Lembang



On farm forage production (King grass, *Pennisetum purpureum*) for milk production, Lembang







Dairy farming as a family business in the Lembang area (KPBSU cooperative). This farmer family started in the 70's with dairy farming (on the picture below: farmer with his wife and representative from dairy industry and advisor of dairy cooperative). At the moment 3 sons and 1 daughter have their own dairy farm adjacent to their parents farm while also the grandchildren show interest in dairy farming (on the picture on top: son milking the cows of his parents).

### 3 Government Dairy Policy

The Department of Animal Production and Technology of Bogor Agricultural University in cooperation with the Directorate of Ruminant Production of the DG Livestock Services of the Ministry of Agriculture has made an extensive review (in this report called Blue Print) of the dairy sector in Indonesia (Toharmat et al., 2007). Limitations and possible solutions were discussed with stakeholders. The Blue Print limits itself mainly to the development of the primary sector and milk processing at local level. Development strategies and roadmaps were formulated. The report provides much information in relation to the primary production sector and indicates various strategies to overcome the problems the sector faces. However, the report seems to lack an integrated approach to the various problems, as well as a clear priority setting of strategies and possible solutions.

Based upon, among others, the Blue Print and other sources, the Ministry of Agriculture has set a number of major goals for dairy development:

The major goals are:

1. Self-sufficiency in milk production to increase from 25-30% at present to 50% in 2015;
2. Expansion of dairy production in suitable areas outside Java, especially Sumatra and Sulawesi.

Moreover, important goals are to increase efficiency of farm management and milk quality:

3. Milk production per cow to increase from 8-10 kg cow/day to 15 per cow/day (in 2015?);
4. Calving interval to be reduced to 13 months;
5. Milk quality to be improved from 12% of total milk that meets the SNI standards to 20% meeting the SNI standards in 2015;
6. To ensure dairy farming remains feasible from an economic point of view, the minimum milk price to be kept at a level of at least 80% of world market prices.

The 50% self-sufficiency has been a policy goal during previous development plans. The goal to keep milk prices for locally produced milk at least at a level of 80% of the world market price means that producers will have to keep costs at a low level. Present low world market prices (February 2009) are likely to have a negative effect on the farm-gate milk prices. Large fluctuations in milk price bear a number of risks, like lack of interest of farmers too invest, increase of part time farming resulting in less attention paid to farm management etc. These risks may endanger the sustainability of the sector in the longer term.

The policy objectives show the interest of the government of Indonesia to increase milk production, through improving efficiency of farm management and expansion of milk production, as well as to improve milk quality. The goals however are ambitious given the limited time.

Present government policy instruments include among others financial support to farmers groups (subsidies of 300 million IDR per group, of which 80% has to be spent on purchase of cattle and 20% can be spent on other activities) and provision of free services, like AI services and animal health services and advice to farmers (through) local governments. Increasing milk production by expansion of the dairy herd may conflict with the goal to increase the milk production per cow as feed resources on the farms are limited.

## 4 The Dairy Supply Chain

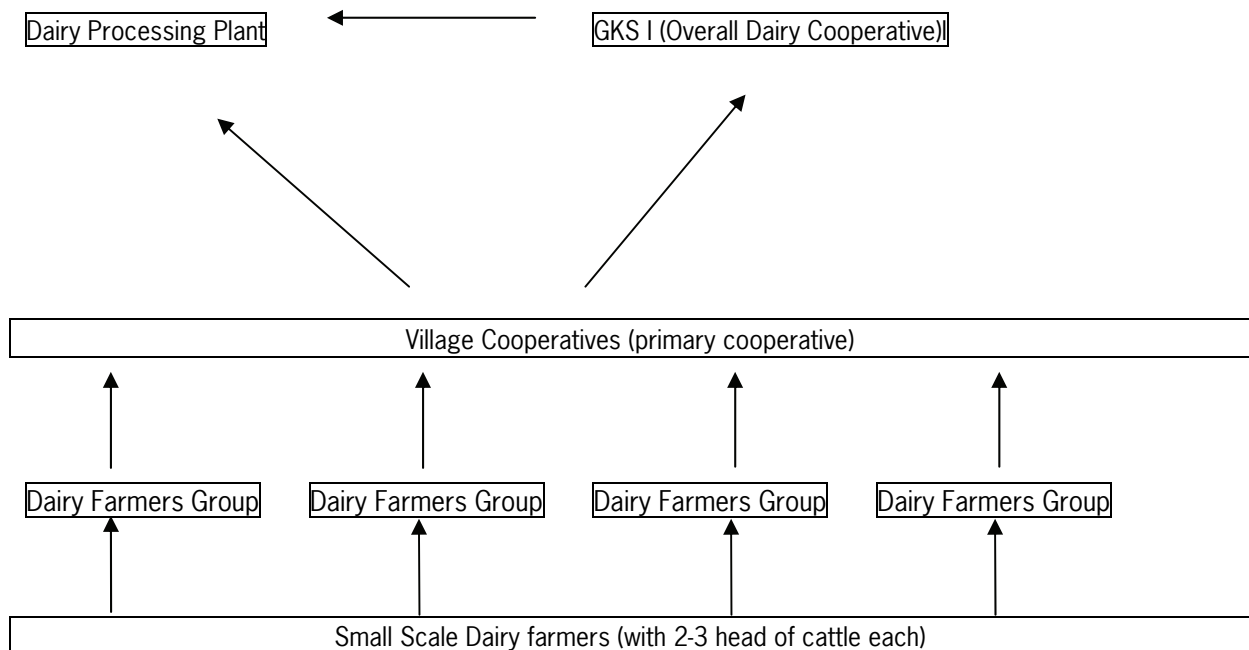
### 4.1 General

The following actors are active in the formal dairy supply chain in Indonesia:

1. Milk producers
2. The primary dairy/ village cooperatives (KUD)
3. The overall dairy cooperative (GKSI)
4. The milk processors/ dairy industry
5. The government (Ministry of Agriculture and its departments).

Figure 1 shows the milk flow in the formal dairy chain. The role of GKSI in marketing and facilitating transport of milk to the milk processors has become less important. Nowadays, the larger dairy cooperatives make direct contracts with the dairy industry and organize their own transport. Not all milk is tapped by the cooperatives. Inounou et. al. (2003) mentions that 90% of all milk is collected by the cooperatives at Java and 10% is sold locally - directly to consumers or processed. This includes also 2% milk produced outside Java. Some of the large scale farms process and market their own milk. Others (Jöhr, 2008) mention that about 80% of total milk is processed by the organized dairy industry and that about 70% of total milk production is supplied to the dairy industry through the cooperative network while 10% is supplied directly.

**Figure 1** Organization of small scale dairy farming and flow of milk (adapted from Inounou et al., 2003)



## 4.2 The Milk Producers

### 4.2.1 Limitations in farm management and options for improvement

Small scale dairy farmers in the higher altitude areas of Java produce most of the milk. Over the last decades profitability of dairy farming has been relatively low, due to low farm gate milk prices (low world market prices of milk powder) offered by the dairy industry (Suksmaningsih, 2005), lack of good farm management and inadequate services. In December 2008 farmers (Lembang, 2008) confirmed that profitability was much better. However, in 2009 world market prices for milk powder were very low again.

Small scale dairy farmers face among others the following technical limitations:

- lack of land for growing forage;
- lack of knowledge (feeding, recording etc.);
- concentrate feeds of rather poor quality (low in protein, energy);
- lack of replacement stock due to sale of calves;
- poor quality of replacements due to poor calf and young stock rearing practices;
- long calving intervals;
- animal health problems (mastitis, brucellosis);
- relatively low (genetic) potential of cows for milk production.

Most dairy farmers practice zero-grazing (cut and carry or stall feeding) and lack of land to grow forage is a major limitation for farmers to expand their dairy enterprise and/or for new farmers to start with dairy farming. Possible solutions are intensification of forage production (fertilization and cutting management) and expansion of forage production into public or private estates. In Lembang, the dairy cooperative KPBSU has made a contract with the Forest Department so that members of the cooperative can grow forage on about 1000 acres in between young trees in the production forests. Similar approaches are proposed in the Blue Print (Toharmat et al., 2007), including growing of forage or grazing in plantations.

Inadequate feeding is another major problem, related to lack of forage. Unbalanced feeding (often too much concentrate in relation to forage) and poor quality concentrate feeds lead to poor nutritional status and often also fertility problems of the cows. Reproductive problems and low conception rates resulting in long calving intervals are often related to feeding (minerals, inadequate energy supply at beginning of lactation). Health problems like metabolic diseases and displaced abomasums are caused by poor feeding practices. A number of simple innovations like growing more forage, chopping of forage, and better quality concentrates in combination with improving the farmers' knowledge could improve the feeding practices.

Lack of replacement stock limits the possibilities of the farmer to select within the herd and to sell problem cows. Because of the limited availability of land, farmers tend to keep limited numbers of replacements and many farmers in West and East Java sell one-week old calves to farmers in Central Java who rear the calves and resell them again as heifers-in-calf to farmers in West and East Java. Most calves and young stock however, are not properly reared and these heifers in calf often show stunted growth and delayed age at first calving. Also at the dairy farms themselves, young stock rearing is a problem, because of lack of proper feeding and housing. Proper rearing of replacement stock, either on the small farm itself or on a central young stock rearing farm in the region (for example organized by the coop), will improve the availability of replacement stock and give more room for selection.

Lack of adequate veterinary services cause unnecessary losses of breeding stock. Farmers tend to send dairy cows with a serious problem (displaced abomasums etc.) quickly to the slaughter house in order to still obtain some revenue.

The housing of the dairy cows on small scale farms is often not ideal. Cows are kept in open tied barns (see also pictures). Cows have limited possibilities for exercise, which often results in foot and leg problems, poor hygiene, and poor heat detection. Also at the National Dairy Training Centre in Lembang, tied barns with pipeline milking system were built (JICA funded: Hokaida model). Simple free barn systems for small holders like the Kenyan zero-grazing model provide much better conditions regarding hygiene and animal welfare. These seem not to have been tried. Simple free barn systems will most likely be cheaper to build than the present tied barn systems and could be an innovation to be tested.

Proper waste management to ensure recycling of nutrients is another point of attention. Collection of liquid and solid fractions of the manure and return to the forage area are important conditions for the sustainability of the forage production and its intensification in the long term. High productive grasses like king (Napier) grass (*Pennisetum purpureum*) require high levels of fertilization to remain productive. Initiatives are undertaken to introduce biogas systems on dairy farms ( JICA project, Widodo et al., 2005) but biogas production at farm level meets still a number of technical problems.

#### 4.2.2 Services and input supply

Lack of knowledge is an important factor to improve feeding and other farm management practices. The National Dairy Training Centre in Lembang and other provincial centers (among others dairy training center in Batu, East Java).The JICA Indonesia project has developed very comprehensive and practical manuals for dairy farmers and for extension workers. Farmers can obtain advice from government livestock officers in their district, who are trained or obtain information from extension staff at provincial level. Besides, paramedics backed by government veterinarians provide farmers with advice. The training of trainers programs at the National Dairy Training Centre, Lembang supported by JICA, is mainly directed to veterinarians and extension staff employed by the Ministry of Agriculture and less directed to training of staff of cooperatives, although they can participate.

A number of dairy cooperatives employ their own extension workers and veterinarians to serve farmers. This system may be more sustainable in the long term than the government services: Contact between farmer and cooperative service is more direct and frequent (in the case of the dairy coop KPBSU in Lembang, at the collection point farmers can twice a day report the need for veterinary or AI services); farmers pay (indirectly) for the services and therefore will demand quality and commitment.

In a number of areas, two types of advisory and supply services (government and cooperative) run concurrently. There seems to be no clear division of tasks, although extension staff of the cooperatives focus more on milk quality.

The concept with key farmers (farmers who act as example to other farmers and extension agent) worked out well in earlier cooperation programs of the MoA and JICA. Similar concepts were successful in dairy projects in other countries (extension point farmers in Kenya, pilot farm approach in Eastern Europe).



Production of concentrate feeds (feed mixing) at dairy cooperative KPBSU in Lembang



Milk collection and quality control (alcohol test and lacto meter) at milk collection point in Lembang area (KPBSU dairy cooperative)

### 4.2.3 Breeding

The Indonesian Holstein Friesian (HF) originates from Australia and is the main dairy breed in Indonesia. From the start of dairy development, large numbers of dairy cattle were imported (mainly from Australia) and distributed to small scale farmers. Farmers received cattle on loan from the cooperatives. Besides HF, some small numbers of Jerseys and the dual purpose breed Simmental were imported.

The Blue Print (Toharmat et. al., 2007) provides a classification of the dairy cattle population regarding production capacity. In the Blue Print it is estimated that about 85% of the dairy cattle population have a genetic potential for milk production of less than 16 kg per cow per day. There is a wish among a number of breeding experts to widen the genetic base by using HF genetics from Europe and/or USA.

There are 2 national AI stations in the country: the AI station in Lembang, West Java (established with assistance of the New Zealand government) and the AI station in Singosari, East Java (established with assistance of the Japanese government). Both centers collect and distribute semen from dairy bulls (Holstein Friesians) from Australian or local origin. The AI station in Singosari also trains AI technicians (JICA assistance). Semen is distributed through MoA provincial offices and provided free of charge to farmers, through cooperatives on contract and by direct selling. As mentioned earlier, more AI stations are being established through local government initiatives.

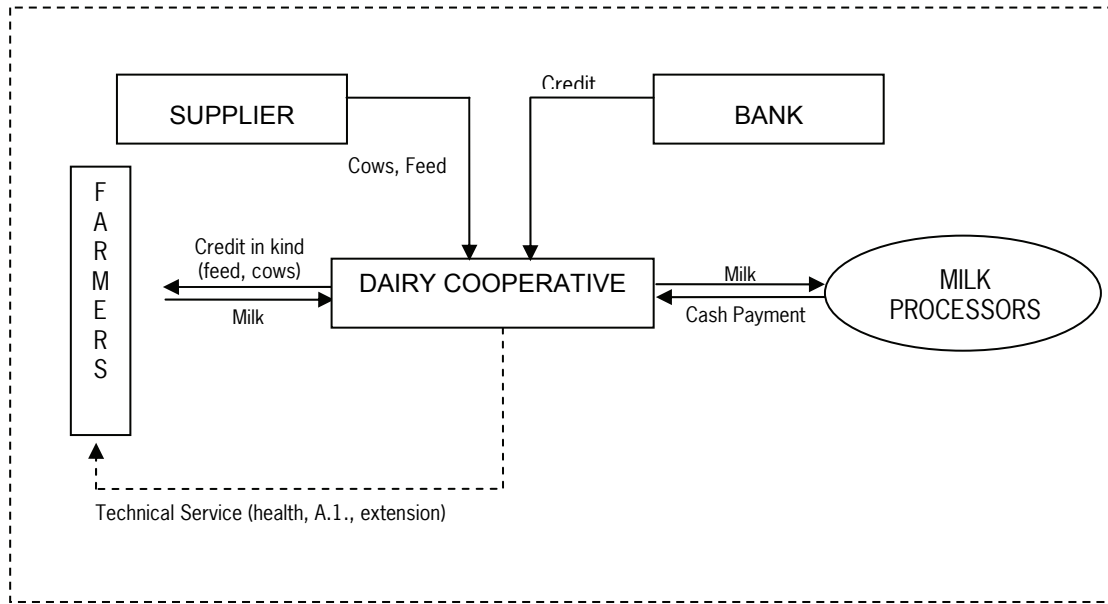
From 1998-2002 a pilot progeny testing scheme was tried out in the Bandung area. On a number of farms, 50 high yielding cows were selected as bull mother, which resulted in 8 test bulls. About 3000 cows were inseminated with these test bulls and the final result was 2 bulls with a positive breeding value for milk. At the moment a national progeny testing scheme is carried out with about 6200 cows and use of 8 test bulls. Continuation is not sure because funding seems to be a problem (Meylinah, 2008).

Next to improvement of dairy cow fertility and better young stock rearing, import of dairy cattle is another option to increase milk production potential quickly. Import of dairy cattle is an option when establishing large scale dairy farms either on Java or outside Java. For example some universities (IPB, Bogor and Gaya Mada University in Jogjakarta) have plans to establish large dairy farms for research, but also as income generating activity. Importation of dairy cattle to supply small scale farmers with breeding stock will require soft loans. Many farmers however still are paying back (to the cooperatives) the loan for the cattle supplied to them many years ago. Increase of the dairy cattle population by making use of sexed semen (for example on heifers in young stock rearing farms) could be a cheaper option in future than importation.

## 4.3 The Dairy Cooperatives

Dairy and/or village cooperatives assist dairy farmers by collecting and selling milk to the milk processing industry and/or by processing and marketing of milk. Moreover, cooperatives provide inputs, credit in kind (feed and cows), and services to farmers. This "cooperative model" (see figure 2) was introduced nationwide after 1983 (Sulastri et. al, 2002).

**Figure 2** Cooperative model for dairy sector. Source: Kartadihardja, 1988 in Sulastri et al., 2002



Efficient collection schemes, effective chilling equipment, and high standards of hygiene at the collection centers are needed to keep collection costs low and to improve milk quality. At present there are about 90 primary dairy cooperatives in the country. These cooperatives collect milk from their members. Many cooperatives have cooling facilities at collection centers and/or collection points, either on loan or pre-paid by the dairy industry, supplied from donor funds, or financed by the cooperative itself. The cooperatives without cooling facilities can take the milk to the cooling facilities of the overall cooperative GKSI where milk is cooled and thereafter transported to the dairy plants. The role of the overall cooperative GKSI in facilitating cooling and transport is declining. Many primary cooperatives deal directly with the dairy industry.

Many cooperatives provide services for farmers as well. Supply of concentrate feeds is the most important. A well-developed cooperative like the KPBSU in Lembang not only supplies concentrate feeds but also provides veterinary services and AI services to members. The services are paid collectively (through collective deduction from the milk price). KPBSU employs extension staff, veterinarians and AI technicians. Members pay a fixed fee per liter of milk. Besides, this cooperative exploits a shop, processes part of the milk, and sells small quantities of pasteurized milk.

Most dairy cooperatives produce cheap concentrates (price setting is an important issue for the farmers) at the expense of the quality (too low protein levels while energy content is often also too low). A cooperative can negotiate for and facilitate services which are out of reach for individual small scale farmers like acquiring land to grow forage (see box).

*Forage production in forests (see also pictures)*

The dairy cooperative KPBSU at Lembang has made an agreement with the Forest Department to use land (about 1000 acres) in the commercial forests for forage production. Members have been allocated plots and plant forages in between young trees that are grown for commercial purposes. The cooperative facilitates members with transport of forage to the farms. This is a win-win arrangement. For the Forest Department there is no need to maintain the areas between the young trees and the farmers have extra land for forage growing. These type of arrangements are also practiced in other cooperatives.

Risks of this arrangement could be that farmers will tend to keep more cows instead of better feeding the cows they already have. Another point of concern is the sustainability of the forage production in the long term, which will require recycling of soil nutrients either by fertilization or through recycling of manure.



The management of the cooperatives is crucial. The dairy cooperatives are a democratic institution and for organizational matters supported by the Ministry of Cooperatives and the overall dairy coop GKSJ. The dairy cooperatives have a small board of directors (chairman, secretary and treasurer) and a supervisory board. Both boards are composed of member farmers. Many cooperatives have difficulty in electing farmers who are competent for board positions. Capacity building of management and members of cooperatives is an important issue.

A number of cooperatives also employ extension workers. Extension officers still concentrate on individual farm visits and seem to be more reactive (for example reacting to a problem with milk quality) than pro-active. The impression is that group approaches in extension, with application of participatory methodologies (for example farmer field school approaches) could make extension more efficient and more farmer directed. This requires more training of trainers. Within the dairy cooperative there are often registered farmers groups in a village or neighborhood engaging in certain common activities like dairy farming, that could be a possible vehicle for extension.

*Linking university graduates with farming practice*

A recent initiative of the Ministry of Agriculture is a program to link fresh university graduates (animal husbandry course from IPB and other universities) with existing farmers groups consisting of 15-20 farmers. The program works as follows: the graduate makes a 3 year contract with the group to assist them with the development of the livestock activities (so far the program has been limited to beef cattle farmers but in 2009 also dairy farmers can make use of it). The MoA pays the graduate's salary during the first year. It is expected that the graduate will develop enough business (for example by starting a farm himself) to generate his own income. The group gets a subsidy of 300 million RPs of which 80% is to be spent on purchase of cattle and 20% can be spent on other activities. The basic idea behind the program is to reduce the (hidden) un-employment among the fresh university graduates and to give additional technical and institutional support to farmers groups. The program started in 2007 with 10 graduates and in 2008 200 graduates enrolled in the program. The program so far is considered successful by the Ministry. The risk is that if the graduates are not well guided, the benefits for the group could be small. Coaching and exchange of experiences among participants could contribute to an effective program.

#### 4.4 The Dairy Industry

Five dairies dominate the dairy market with Frisian Flag Industries/Foremost being the main producer of milk products and second regarding the processing of locally produced milk.

Table 1 presents the market share of the dairy plants regarding the processing of locally produced milk in 2007.

**Table 1** Major milk processors in Indonesia and their market share of local produced milk in 2007 (data FFI)

Milk processors	Volume (million l/year)	Market share
Nestlé Indonesia	162	35.8
Frisian Flag Industries/Foremost	123	27.1
Indomilk/Indolacto	68	15.0
Ultra Jaya	30	6.6
Sartihusada	12	2.7
Others (among others Danone)	58	12.8
Total	453	100

Nestlé dominates the market in East Java (1 dairy plant). In West Java, Frisian Flag/Foremost and Indomilk/Inodolacto have both 2 factories, Danone (previously Numico) 1 and UltraJaya 1 (Fabiosa, 2005) The Indonesian Consumer Organization (Suksmaningsih, 2005) mentions that at national level an oligopolistic market situation exists resulting in too low farm gate milk prices. From 1982-1998, government regulations required the milk processing industry to produce milk products from locally produced milk and recombined milk (from imported milk powder) at fixed ratios. This regulation was abolished in 1998 after the financial crisis, among others as part of conditions imposed by the IMF readjustment program to lower consumer prices. Current government policy imposes limited government restrictions on imports of dairy products, although bureaucratic import procedures may take long. For finished products an import tariff of 5% is in place.

The major problems in relation to local milk supply are the competition for the supply of raw milk and the raw milk quality. Payment schemes according to milk quality are introduced (see table 2) but price differences are still small. Some individual dairy plants pay extra premiums for better quality milk.

**Table 2** Milk payment scheme (from July, 2007) according to composition and hygienic quality (adapted from Meylinah, 2008 based on information GKSI)

Milk product	Milk price (IDR)	Euro cents (rate 1-12-2008)
Grade 1 - TS -12%; TPC < 250,000	3047	18.8
Grade 2 - TS- 12%; TPC 250,000-500,000	2947	18.2
Grade 3 -TS-12% TPC >500,000- 1 million	2847	17.6

Official TPC standards (Ministry of Agriculture) are 1 million cfu/ml. Milk samples for analysis are taken after the milk has arrived at the dairy plant. High levels of TPC are not only caused by the milking conditions at farm level but can be caused also by poor hygiene during the handling of milk during collection and transport to the dairy plant.

Milk prices were raised in 2007 (see table 2). Due to the very high prices of milk powder on the world market, the dairy industry raised milk prices in 2007 even more by paying an extra bonus (this bonus was lowered in 2009). The dairy industry develops closer ties with the cooperatives to secure a steady milk supply and to improve raw milk quality. Frisian Flag with assistance of Netherlands consultants assisted the cooperative KPBSU in Bandung especially concerning improvement of milk quality. Frisian Flag for example carried out a partly Netherlands government funded project with the KPBSU dairy cooperative in Lembang and assists a cooperative in Central Java. At present, about 80% of the milk delivered by KPBSU cooperative has a TPC of less than 250.000 cfu (bacteria)/ml (KPBSU, 2008). At first, the technical assistance concentrated particularly on improvement of milk quality (technical assistance, equipment at collection centers etc.). New players like Danone (which has taken over activities of Numico) provide support to cooperatives and individual farmers. Nestlé assists cooperatives in East Java with provision of cooling equipment at collection points and centers, training of farmers, and feed supply (Jöhr, 2007). UltraJaya plans to invest in a dairy community (about 900 cows) where farmers can milk their cows in a central milking parlour (dairy community model).

A challenge for the dairy industry will be to add more value to the locally produced milk. In Malaysia for example, the limited locally produced milk is branded as “fresh milk” and sold at a higher price by some dairy plants. However, a pre-condition is that milk quality has to be improved considerably.

#### 4.5 Consumers

If income growth will be sustained and urbanization will continue, westernization of diets with increasing consumption of animal protein is likely to continue as well. Households are likely to change part of the diet from fish to dairy and meat products (Fabiosa, 2005).

Consumer prices will fluctuate with prices of milk powder in the international market. The extremely high prices for milk powder in the international market in 2007 forced the dairy industry to raise consumer prices with 20%. This resulted in a lower consumption, as some of those in the lower income class switched to soy milk (Meylinah, 2007). An increase of local milk production could reduce strong fluctuations in consumer prices.

Milk products in the supermarkets are relative expensive compared to EU countries. Suksmaningsih (2005) mentioned also that milk prices in supermarkets were at equal levels with dairy products in Australian supermarkets and that farmers received too little of the margin. A quick and dirty survey in the supermarket showed prices of UHT milk per liter on average of about 12000 IDR/litre (about 80 euro cents, December 2008) while prices (including the extra bonus payment of the dairy industry) paid to farmers (KPBSU, Lembang) are about 3200 IDR/liter (about 20 euro cents, December 2008). The ratio producer/consumer price based on the available information is 3.75. This ratio is about 2 in the Netherlands but comparable with Turkey where the ratio

producer/consumer price was about 3.5 in 2006 (CBAT,2007). Several factors contribute to the large difference between producer and consumer prices but high collection and transportation costs are important factors.

More and more consumers buy their food supplies in supermarkets. The world wide spread of supermarkets is taking place in waves. Indonesia belonged to the second-wave countries where the average share of supermarkets in food retail increased from 5-10% in 1990 to 30-50% in the early 2000's (Reardon et. al, 2006). After the financial crisis in 1998, the government deregulated investment in the retail sector, allowing foreign retail companies to enter the market. This resulted in an increase in foreign owned and national retail chains and whole sale outlets (Morey, 2005). This process is still continuing. Supermarkets in general will require steady supply of high quality products at reasonable prices. The established, modern large scale dairy industry (IPS) can meet these demands, but this will be more difficult for small scale processors.

So far consumers buy mostly dairy products with a long shelf life (milk powder, UHT milk, sweetened condensed milk), but cold chain "fresh" milk products like pasteurized milk and yoghurts can be found in supermarkets and their share is likely to increase when more refrigeration facilities become available at households and consumer tastes change. These products however require raw milk of high quality. Also food scandals like this year's melamine crisis in China make consumers more aware of the potential risks when consuming dairy products and most likely will be translated into higher quality demands by supermarkets.

#### 4.6 Discussion

There are a number of major factors affecting the development of the dairy supply chain. The most important are the dependency on imports of milk powder, the fluctuating world market prices, the lack of protection for the local milk producers (which means that milk prices paid to farmers will be lower than world market prices), the scale of milk production (many small scale producers) resulting in generally high collection and transportation costs, and the poor raw milk quality.

The dependency on the world market can be reduced by increasing local milk production. For many years government policy has been to increase local production to 50% of domestic need. However, increase of local production is limited by the relative low profitability at farm level (low milk prices (this improved after 2007), relative high feed prices and the low production levels per cow caused by inadequate management (feeding) practices and the limited possibilities to expand dairy farming at Java.

Possible solutions to increase local milk production and profitability at farm level are:

- *Increase in milk production at farm level by improved management practices.*  
Increase of milk production in the present production areas could be achieved by increasing the number of cows and/or the milk production per cow. Too often, farmers tend to increase the number of cows while milk production per cow decreases due to the limited feed resources. There is still scope to increase the milk production per cow by improving management practices and intensification. Major limitations are feeding, poor cow fertility, young stock/replacement rearing, and disease control (mastitis, metabolic diseases). Improvement of feeding practices (better quality concentrate combined with more forage of higher quality could result in higher yields per cow and also solve some of the feed related fertility and disease problems. Using low cost ingredients to keep feed costs low means in general feed of poorer quality and poor economics in the long term. Increasing farmers knowledge regarding feeding will be an important issue. The genetic potential is considered to become a limiting factor too.

Technical data and economic data collected at farm level on profitability of dairy farming (cost price of milk) are not available. This requires data collection at farm level. In addition more dialogue with farmers is needed to gain more insight in farmers' perceptions concerning problems and solutions. Training of farm advisors (who will train farmers), application of participatory extension methods, and introduction of new innovations on key farms (demonstrations, applied research), combined with better concentrate feed production, improved input supply and data collection at key farms could improve farmers management. The basic starting point should be to develop options and activities for improvement jointly with the farmers.

The dairy cooperatives could play an important role and are an important vehicle to reach the farmer. Government services could be an alternative for farmers to get advice and services. They often lack adequate funding and are not able to provide short term credit like cooperatives can. Moreover, dairy

cooperatives can act quicker as there are daily contacts at the milk collection points. If management is sound, value adding activities like processing could result in higher milk prices for farmers. Empowerment of the cooperatives through capacity building of members, board members and managers is thus very important.

An integrated approach by strengthening of the cooperatives in several aspects (services to farmers, milk collection, feed production etc, but also the coop organization) could contribute to an overall improvement of the dairy chain. Such an approach should pay attention to improvement of management at farm level, improvement of services (feed supply, AI), increasing the efficiency of milk collection, transport, and the organization of the cooperative.

*Higher milk prices or creating more value through government support*

Protective measures of the government to mix locally produced milk with imported milk powder at fixed rates are not likely to return as this will affect consumer prices (Inounu et al., 2003). Government could facilitate the primary sector by means of other policy instruments like subsidies, tax policies, improved services, facilitating land availability for forage production (forests, plantations) etc. Especially in the areas outside Java, support is needed in the first stages to develop a sustainable dairy supply chain.

Farm gate prices could be increased also by reduction of losses. Losses and collection costs could be reduced considerably if the hygienic quality of the raw milk would be improved. This could be achieved by farmer education, more incentives for farmers and good collection, cooling and management practices by the cooperatives so that the costs of collection and transport will be reduced.

Adding value to the milk by local processing and marketing of the milk could be another option to obtain a higher farm gate price. A start is made by a number of cooperatives to process a part of the milk into fresh products like yoghurt or pasteurized milk. In general, these activities seem to be small projects. The profitability is not clear and will depend also on the milk prices offered by the large scale dairy industry. The lower the farm gate prices offered, the higher the urge will be to start processing at cooperative level. However, adding more value to locally produced milk should also be a challenge for the established large scale dairy industry, to prevent loss of market share in the long term. The limited number of large scale farms often combine production, processing and marketing. Small scale milk processors could serve local and niche markets but it might be difficult to serve the supermarket chains (because of steady supply and quality demands). Small scale processors require also more and strict supervision from food safety point of view as facilities and processing procedures are less controlled and often of lower standard than in the large scale industry, which operate with modern facilities and apply international accepted quality standards. The government (MoA) is developing standards and regulations in consultation with the stakeholders, but so far inspection seems to be limited. Capacity building concerning food safety issues related to raw milk quality and milk processing will be needed so that government can enforce regulations. Food scandals can have a serious effect on the whole industry.

## 5 Options for The Netherlands to contribute to the development of the Indonesian dairy supply chain

### 5.1 The relation of the Netherlands with the Indonesian dairy sector

At present the Indonesian dairy sector is very much oriented at Australia and New Zealand which has supplied dairy cattle and genetics, technical assistance, training and education since the 70's.

The Netherlands has a long tradition in dairy farming. There is much expertise and know how regarding dairy farming and dairy supply chain development as well as a well developed dairy industry, feed industry, breeding companies, input supply etc. There is also ample expertise and knowledge (Wageningen UR, PTC+, consultants ) concerning development of small scale dairy farming under tropical conditions (East Africa, Sri Lanka, India, Vietnam, and Indonesia). The Netherlands has provided technical assistance during the 80's of last century to the dairy training centre in Batu (East Java) and the Department of Animal Sciences of Wageningen UR collaborated with Brawijaya University in the field of livestock (including dairy) in Malang (East Java). More recently the Netherlands government supported PSOM projects that were implemented by the KPBSU dairy cooperative in Lembang and assistance was provided for establishment of a small scale private milk plant producing yoghurt.

Main reasons for the Netherlands for further development of business relations and/or provision of development support to the dairy sector are:

- Gol shows interest in further development of dairy sector given the blue print and policy goals; the dairy industry shows interest in development of the dairy supply chain as well;
- The bilateral agreement between the Indonesian and Netherlands government which provides the framework to support the agricultural sector Indonesia;
- Market prospects are good in the long term: consumption of dairy products is likely to increase with increasing incomes;
- The perspectives for improvement of farm management and introduction of new innovations at farm level are good, as profitability at farm level has improved since last year (however, in 2009 milk prices were under pressure because of low world market prices for dairy products);
- Major Dutch companies like FrieslandCampina and Nutreco are present.

### 5.2 Perspectives for development of business relations

#### 5.2.1 Dairy industry

Frisian Flag, daughter company of the Netherlands dairy cooperative FrieslandCampina is the largest dairy company in Indonesia. Input supply companies could possibly take advantage of the prominent position of Frisian Flag in the dairy supply chain and cooperation could lead to a better positioning of the Netherlands agribusiness in Indonesia.

#### 5.2.2 Input and service supply

##### **Genetics**

Australia has provided dairy stock and genetics since the 70's. There is a wish among Indonesian breeding experts to broaden the genetic base of the dairy stock. This opens perspectives for export of semen or breeding bulls for AI stations. In the long term there may be a market for sexed semen when expansion of dairy farming to areas outside Java takes place and demand for replacements increases.

##### **Feeds**

Quality of concentrate feeds is a limitation. Depending on price setting, there could be a market for pre-mixes (minerals, vitamins) and high protein concentrates to be mixed with locally available energy products at the feed plants of the dairy cooperatives. Cooperatives could be important partners for the introduction and sales of milk replacers and starters.

### **Milking, cooling, milk processing and barn equipment**

Improvement of milk quality requires quick cooling of milk and installation of cooling tanks at milk collection stations and eventually collection points. Second-hand milk cool tanks could possibly compete with cheap supplies from other Asian countries. An increase of small scale milk processing offers additional opportunities for sale of dairy equipment.

### **5.3 Development cooperation**

Milk in Indonesia is mainly produced by small holders for whom it is an important income generating activity. At the same time milk production provides employment opportunities in the rural areas (extra labour on farms, for milk collection and transport, feed plants etc). Further development of the dairy supply chain will contribute to poverty alleviation in the rural areas.

Programs to improve dairy farming and the efficiency in the dairy supply chain should focus on:

- working with well managed cooperatives with involvement of other stakeholders like government (MoA) and local government advisors, knowledge institutions as IPB, ICARD and training centers;
- applying an integrated approach with attention to the various aspects of the dairy supply chain: feed supply, disease control, young stock rearing, training of farm advisors, farmers' training, introduction of new innovations by on-farm research, efficiency of milk collection and cooperative organization;
- adopting a participatory approach by working with dairy farmers groups applying group extension methods (for example farmer field school approach);
- introduction, testing and adoption of new innovations by on-farm research and demonstration, for example better quality concentrates, intensification of forage production, new housing systems (zero-grazing unit for small scale dairy farms like developed in Kenya), disease prevention (mastitis), young stock rearing with milk replacer on farms selected by dairy farmers groups;
- cooperation with Netherlands agri-business (dairy industry, feed industry etc) for identifying and testing new innovations;
- evaluation of successes and failures and dissemination of results and lessons learnt to stakeholders, cooperatives.

The following are project options:

1. Support to a dairy development program at West Java initiated by dairy cooperative and industry addressing the following issues:
  - Capacity building of farm advisors and farmers (training of trainers should be an important aspect).
  - Extension of improvement of management practices, particularly regarding feeding, forage production, disease prevention (particularly mastitis) and young stock rearing.
  - Introduction of new innovations like use of milk replacer, better quality concentrate, housing system, milking which could first be introduced and tested on key farms. For the on-farm research part knowledge institutions should be involved.
  - Data collection on technical parameters (cow fertility, amounts of forage produced and fed, forage yields, feeding calendar) and economic data at the farms could provide more information on cost price of milk, labour requirements etc.

Knowledge institutions could be involved in the following aspects:

- Research on improvement of raw milk quality and collection system by sampling and testing milk at various steps in the chain and defining options to improve.
- Participative design and monitoring process for selection of innovations to be tested.
- Project monitoring by identifying success and failure factors during the lifetime of the project (project monitoring).
- Dissemination of results through seminars, training and knowledge institutions.

Indonesian partners in such a project should be the dairy industry, dairy farmers cooperative, Ministry of Agriculture and its local farm advisors, knowledge institutes like IPB and ICARD. From the Netherlands side a dairy consultancy group experienced in small scale dairy farming, knowledge institutions and private companies (feed) could be involved. The project could also result in increased cooperation between the Indonesian and Netherlands knowledge institutions.

2. Another option for a development project could be directed at the expansion of dairy production outside Java. This requires an integrated chain approach: milk production combined with input supply, processing and marketing. This could be small scale dairy farming combined with milk processing and marketing by a dairy cooperative, or a large scale nucleus farm which will involve in processing, or a combination of both. However, a more detailed feasibility study is required to identify project opportunities.

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## Annex 1. People met and contacted during and after fact finding mission

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Prof. Dr. Ir. Ronny R. Noor	Former Dean Agriculture Faculty, Animal Genetics
Dr. Ir. Cece Sumantri	Head of Department of Animal Production and Technology
Dr. Ir. Nahrowi Ramli	Head of Department of Animal Nutrition Also: Feed specialist, Centre for Tropical Animal Studies
Dr. Ir. DEA Suryahadi	Research and Community Empowerment Institute, IPB
<b>ICARD (Indonesian Centre for Animal Research and Development), Bogor</b>	
Dr. Ir. Abdullah Mhafud Bamualim	Director
Dr. Bess Tiesnamurti	Head of Programme and Evaluation Division
<b>SUCOFINDO (private company)</b>	
Mr. Syaeful Bahrie	Auditor (also of feed companies, certified by Productschap Veevoeder)
<b>KPBSU (Lembang)</b>	
Mr. Taryat Ali Nursidik	Operating Manager
Mr. Toto Abidin	Board of Directors, Treasurer
<b>4 dairy farmers + extension officer</b>	
<b>AI station Lembang</b>	
Mr. Amsal Rusjdi	Head Quality Control
<b>JICA/ National Dairy Traing Centre</b>	
Dr. Pammusureng	National project coordinator (JICA-Indonesian Project Dairy Cattle Health)
Ir. Andri Arfiana	Director Breeding Section
Mr. Shigeru Minami	JICA expert dairy cattle health (veterinarian)
<b>Trouw Nutrition (Nutreco)</b>	
Mr. T. Hovers	Area representative