

Poultry Science Education and Its Interaction with Research and Industry

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The poultry industry is rapidly expanding world-wide, but with significant intensification, consolidation and sophistication in all links of the “farm-to-fork” food-chain. Globally, there is a need for well trained students to fill many managerial positions within the poultry industry. However, the changing nature of the industry demands “targeted” education opportunities and more technical specialization. Generic solutions to complex problems faced by the poultry industry are no longer adequate and needed. Current and future problems facing the poultry industry will likely require not only specific knowledge and training in specific fields such as production, processing, food science, microbiology and animal health, but also acquired skills for critical assessment and interpretation of information, problem solving, integration of inputs and people-management.

One approach to fulfill this need is to establish a comprehensive system of poultry science education, both at the undergraduate and graduate levels, as currently offered at several universities in the USA and in Europe. In these educational systems strong links are established between research (academia, research institutes), industry and education. Moreover, the depth of competencies and diversity of disciplines present in these organizations are usually complementary to help strengthen academic and technological advances.

Specific attention is required for education and research in the field of back yard poultry farming, because of its importance in nutrition of the poor in many countries (Alders, 2008). Exchange of experiences on existing and emerging systems of interaction between education, research and industry are much needed and should be facilitated.

Keywords: poultry science, education, interaction, research, industry

Introduction

Poultry industry developed in less than a century from womens ‘pins and needles money’ to probably the most industrialized and integrated industry in animal production. When comparing back yard or subsistence farming across species with ‘cash crop farming’ the difference is most extreme for poultry. Numbers of animals per holding, level of integration, differences in production level, housing, medication, men or women business: in all cases the difference between the type of poultry farming one century ago and now is enormous. The same is true for the consumption and price level of poultry products. These changed poultry products from a food item, often reserved for festivities or the weak and sick, into day-to-day staple with a very high value for money (i.e., very cheap) in terms of nutritional value compared to other animal products.

Today, poultry meat represents almost one-third of meat produced and consumed globally (Scanes, 2007). In view of many technical challenges anticipated in the poultry industry, research and education into poultry sciences had to develop as well. Specific education and training in various disciplines of poultry sciences was required. Within agricultural and veterinary science programs, poultry science departments were the last ones to develop, increasing to a highest number and volume in the sixties of the last century. In the seventies, the decline had already started in Europe and North America. Currently in the US there are about 7 universities that have separate poultry science departments. Whereas in Europe, dedicated poultry science departments have almost disappeared (Kwakkel and Ruiz, 2006). Poultry Science departments are typically merged with other disciplines in animal science and agriculture. Today, technical and theoretical knowledge for the poultry science curriculum is mostly provided by animal science departments.

Completely different from current industrial production of poultry meat and eggs is the back yard poultry farming. Back yard poultry farming is very important for subsistence (nutrition) of the population in many parts of the developing World. It is estimated that about 50% of the World's poultry population is kept in back yard systems.

Whereas the integrated industry is very much capable in expressing and/or fulfilling their needs for education, research and development, this is not the case for back yard poultry farmers. Specific requirements for education and R&D aimed at back yard farming are needed and should be considered in poultry science curriculum. The production of all varieties of poultry requires a well educated staff to continue to respond to the ever increasing demand for poultry meat and eggs world wide (Scanes, 2009; Hunton *et al.*, 2006).

Changes in society and interest of students

The demand for animal products is expected to increase sharply during the coming decennia. This is due to growth of the worlds' population and to consumption of higher proportion of animal products, because of increase in economic prosperity. Among animal products, the demand for poultry products is expected to increase more than proportional (FAO, 2010). Poultry production (and consumption) will continue to expand especially in Asia and South America, while it will stabilize in Europe and North America. The increase in production is based both on increased numbers of birds and increased productivity per bird.

Specifically, the increase in number of birds may be of concern, as intensification of poultry production will require more inputs (feed, energy, etc). The production of poultry feed partly requires arable land which competes with that required for human nutrition, forestry or other forms of land use to capture CO₂. This puts animal production world-wide under pressure. Indeed, environmental issues associated with intensive animal production will become an even greater issue in the future for the poultry industry.

In a number of countries animal production is not only criticized for its effects on environment, but also for its effects on animal welfare and public health. Current and future poultry scientists have to deal with these societal developments in a positive and pro-active way.

Nowadays in the western world only a small proportion of the population has direct links to agriculture and farming. Demographics and changes in societal values have consequences for the number of potential students interested in poultry science (Kwakkel and Ruiz, 2006). Only a limited number of the student population is interested in animal production and among them only a small proportion in poultry (horses and companion animals are more popular). In developing and BRIC countries (Brasil, Russia, India and China) there is more interest in poultry production, especially in poultry processing, product technology, product quality and safety. Students from these countries often search for poultry science education in Europe and North America.

Poultry industry is operating on an international scale and most companies involved in the poultry industry are multi-nationals. Consequently, educational efforts must also be internationalized, for instance by enhancing international cooperation between universities through faculty/student exchange or study-abroad programs.

In spite of the internationally uniform nature of the poultry industry, there are important regional differences. These regional differences (i.e., climate, availability of feed ingredients, societal concerns, logistics, national regulations, etc.) cannot be ignored and must be addressed. Students will have to become aware of these regional differences as most of them will have international careers.

Facing the complexity of current production systems

Despite the changes in attitude of society towards animal production, poultry production itself changed into an extremely high-tech and complicated industry. Each step in the production chain involves a tremendous amount of technology and knowledge on the biology of production, disease prevention, nutrition, processing, manure management, marketing, communication, etc. Where in the old days a student could master most of the aspects of poultry production during a typical curriculum of 4-5 years nowadays the number of different disciplines and the depth of knowledge within each discipline require additional specialization beyond sufficient knowledge of the production system as a whole.

Moreover, in several regions, poultry production has different needs due to local constraints and unique systems. Different national and regional priorities exist and economical and societal factors play important roles in the issues facing the industry. Thus, an international partnership must be set up with adapted goals (Yalçın *et al.*, 2008).

Academic, postgraduate and vocational education

Worldwide, the Anglo-American three phase structure is more or less adopted in poultry education: 2-4 years education for a Bachelor of Science (BSc) degree (under-graduate), 1-2 years more for a Master of Science (MSc) degree and another 2-4 years for Doctor of Philosophy (PhD) degree. Polytechnic colleges, originally aimed at higher level vocational education, nowadays offer BSc and in some countries MSc degrees. In the Netherlands, the difference between the agricultural colleges and universities is becoming smaller both in level and methods. Vocational education in poultry science also suffers from diminishing numbers of students. Yet, industry requires well trained staff and specialized training. Breeding companies, providers of incubation technology, and pharmaceutical companies all provide continuing education courses for their customers (see f.i. a search on the site of WorldPoultry.net). Furthermore, post-graduate courses on specific topics (climate, nutrition, reproduction and incubation) are organised commercially (see f.i. the program of Wageningen Business School) and around the large international exhibitions (VIV, IPE). WPSA and Poultry Science Association (PSA) symposia and seminars also can be considered as postgraduate training opportunities in poultry sciences (Hunton *et al.*, 2006). Vocational and postgraduate education has, in general, a closer link to poultry industry.

One of the possibilities is to develop and propose double degree programmes, specifically oriented to poultry, combining efforts of several teachers and scientists in the poultry science area. Within Europe these options should have more attention by the national Governments. In some cases, however, lack of (industrial) funds prohibits strong mobility of students and teachers.

Another approach is to develop Erasmus Mundus (EM) applications (http://ec.europa.eu/education/external-relation-programmes/doc72_en.htm), where Consortia of EU university partners, associated with international partners from industry and academia, develop joint graduate courses to offer both third country and EU students highly qualified education in a certain field of expertise. Examples are the EM in Animal Breeding and Genetics and the recent submitted EM in Sustainable Animal Nutrition and Feeding.

Students should be encouraged to participate in international exchange programmes, like the EU Erasmus Socrates program (http://ec.europa.eu/education/index_en.htm). To increase the interest of students and cross appointments between universities, the time has come for the internationalization of undergraduate education curricula within animal science programs. In addition, this would provide for a greater diversity in course offering for graduate students and stimulate graduate student training and exchange programs in poultry science.

Challenges for research and education and interaction with industry

For international bodies and national governments in the developed world, there is a moral imperative to support poultry research and education in view of the significant impact that poultry products are having globally on wholesome nutrient supply for people. Moreover, there is also a strong case for poultry as a part of rural economic development program in even the poorest nations (Scanes, 2007). However, the needs for education and research in poultry farming in poor countries (for the most part a back yard and subsistence farming) differ from those with a high tech industrial poultry production. To develop and stimulate back yard farming in poor countries 'governance' becomes important. Only on the long term that such activities will yield revenues for industry. Consequently, timely developments in back yard farming often suffer from shortage of funding.

Research projects in poultry sciences are funded by governmental based organizations, through university-based funds, allied industries and by the poultry industry. Collaborative projects between universities, institutes and industry are becoming more and more the standard. Partly this is because of the quality of research that can be achieved, partly because of reduced funding by governmental bodies. Collaborative research is worthwhile and required to train students in poultry research. These collaborative projects develop easier in projects with application on the short term (i.e., applied research). Collaborative projects involving basic research in which implementation (and revenues) only can be expected on the longer term should also be continually explored.

One basic requirement for success of poultry education and poultry research is to attract sufficient students now and in the future. Growing numbers of students from countries with growing poultry industries (e.g., China, Brazil, and India) is one way to attract more students to the 'old-world' universities. Staffing of faculty of critical mass and of sufficient quality is another point of concern. Here closer connections with industry and research institutes and the involvement of their specialists in poultry science education as guest lecturers might be a workable solution.

Available models

Different models for research, education, and outreach/extension on poultry industry have been proposed. Examples of different approaches include the following:

- Dedicated Poultry Science Departments within the College of Agriculture is a model used in the US. Today, about seven such programs (University of Arkansas, Auburn University, University of Georgia, Mississippi State University, North Carolina State University, Texas A&M University and Pen State University) offer undergraduate degree in Poultry Science, as well as Master of Science and Doctor of Philosophy degrees. All of these departments are staffed with faculty members in diverse disciplines and appointments to carry-out the tri-partite mission of the agricultural schools (i.e., teaching, research and extension).
- Universities, institutes and industry participate in a joint organisation. This model is used f.i. by the Poultry CRC in Australia and the Arkansas Poultry Centre of Excellence. This model implies structural cooperation in the long term.
- Universities and industry cooperation on continuing educations courses. Forexample, the Poultry 101 Course offered jointly by University of Arkansas, Auburn University and Texas Tech University and sponsored by various allied industry companies.
- Cooperation between universities is another model, f.i. the Mid West Poultry Consortium and the Euroleague in Europe. With this model the focus is also long term, but industry is not a direct and active partner. Larger consortia might be more attractive as research partner for the poultry industry rather than smaller or less specialized groups.
- Another model is more dedicated to offering specific courses, f.i. the poultry summer course in The Netherlands, where students from other disciplines are introduced to the poultry sector in a dedicated short course. The Mediterranean Poultry Summit aims at serving the same purpose, but on an international level.
- Finally, dedicated courses organised by industry. It might be worthwhile to examine if this is a signal of an insufficient quality of education or is based on competition between companies in the same field.

Available tools

Depending in the model of cooperation, different tools can be used to increase the quality of education and/or the interaction with industry:

- Internet-based resources for use in poultry science distance education programs (Sossidou *et al.*, 2008). This facilitates cooperation between organisations at different locations.
- Establishing R&D networks to provide the necessary support to the industry and expose students to (research for) industry (Sossidou *et al.*, 2007).
- Introduction of Short and Long Term Training Courses for farmers, hatchery staff, staff from feed companies, advisors from financial institutions, etc. Staff from industry can be incorporated in teaching to increase cooperation and 'fit' of the training.
- Partipation of university staff in courses from industry as Intervets Poultry Veterinary Training (Intervet, Utrecht University, Animal Health Service) and technical courses organised by a.o. Aviagen, Cobb, Lohmann Tierzucht, Hybro, PasReform.

In fact, all these tools help strengthen the linkage between education, students and industry.

Conclusions

Poultry industry is more and more international; world wide well educated staff is required to support the needs of this industry. More and more students will require a strong scientific background in specific disciplines (genomics, logistics, chemistry, economics, etc.) and application of this knowledge in poultry production. Strengthening the linkage between education, research, students and industry will also facilitate the elevation of quality of this type of poultry education and the professional growth of the staff responsible for education. A number of models exist to stimulate such cooperation. Structural cooperation, with an equal partnership between industry and academia seems quite successful for education and research for industrial poultry farming.

(International) cooperation between universities is another model to provide students with a wider variety of courses and specialities. International exchange of students will facilitate their multinational knowledge and awareness, while maintaining their sense of regional differences in culture and development.

Special attention is required for education and research for back yard and subsistence farming. This aspect of poultry farming in many parts of the world is of great importance to nutrition of the poor population and might be a start for more industrialized poultry farming. However, where industry is very well capable to speak for them selves when it comes to requirements in education and research, this is not the case for back yard farming.

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