TECHNICAL DEVELOPMENTS IN THE DUTCH POULTRY INDUSTRY

Prof. Dr. E.H. Ketelaars

The start.

One century ago poultry in the Netherlands was mainly kept in small flocks scavenging around in farm yards in search of feed. The birds did not belong to any breed. In the spring they started to lay until late in the summer. Hardly anyone cared about them. Now and then a brooding hen appeared with a number of chicks. The production was low. In those days the country was even short of eggs. However about 1880 some small specialized poultry farms made already the first attempts to improve their stock, consisting of current poultry landraces, with imported "exotic" breeds. Initially they were not very succesful, but at the end of the century good results were obtained with one breed: the Leghorn. Compared to the indigenous birds it was a large bird, which also laid larger eggs. Within a few years the Leghorns, together with some other "exotic" birds, were also adopted by the small farms. The introduction of new productive stock was the first impulse to a successful development of the poultry in our country.

The second one was the establishment of a poultry association in 1900, which took the initiative in founding egg auctions all over the country and started its own experimental station and extension service.

The results came soon. Already in 1907 there was an egg surplus for export, and this export grew regularly, untill in 1953 Holland became the largest eggs exporter of the world and this is still the case now.

Better breeds, adequate market outlets and extension of proper management techniques to the farmers appeared to be the essential prerequisites for a succesful development. Somewhat later the ample availability of imported feedstuffs, and a growing demand for poultry products in the nearby industrial area of Europe did the rest.

Still a small farm's business.

From 1900 till as late as 1960 the poultry industry in the Netherlands remained a small farmer's business. The flock size seldom exceeded 200 hens. The government tried to reserve poultry for the farmers, especially the small ones, by regulations, but since 1961 everyone was free to keep poultry in unlimited numbers. That was the start of a completely new chapter in the history of the poultry industry in the Netherlands.

After 1960: start of a modern industry.

All limiting regulations being abolished, the poultry units grew larger and larger. Besides egg producing farms also broiler farms came into being. New hybrids were introduced and modern farm management procedurces were rapidly adopted. Mechanization and automation increased. The number of poultry farms decreased rapidly. From more than 200,000 farms with poultry in 1900 we have arrived now at q 4000 farms with q 45 million laying hens, q 800 farms with broiler parent stock and q 1400 with q 40 million broilers. Due to the historical background poultry farms in the Netherlands are still predominantly found in the eastern and southern part of the country, where the small farms were situated. The former small units have disappeared or are of no significance anymore. At the same time the production efficiency increased tremendously.

The supplying and processing industry became more and more involved in the organization and planning of the production as a whole, in so called "integrations". These forms of cooperation are in the interest of all the participants : the producers being sure of the sale of their products, and often of the price, and the industry of the supply of eggs or poultry or the sale of feeds or stock. In the meantime new techniques were introduced to increase labour efficiency in feed and water supply, egg gathering, manure removal and especially climate control.

The increasing competition on the European marker - the EC being more than 100% selfsufficient in poultry products - forces the

Netherlands poultry industry to a still better efficiency and quality. Research and development, both from official institutes and the industry itself, are directed to the achievement of more competitive production systems, but at the same time in accordance with the requirements of the consumers.

A consumers' market: emphasis on quality.

Modern production methods meant a great benefit to the consumer, but they gave also rise to critical remarks. The most important items are now: the animal welfare (battery cagesi), environmental impacts (smell, manure surplusses) and effects on quality (taste, texture, presence of residues and contamination). We are not longer in a producers' , but in a consumers' market. The consunmer decidesi Research and development are therefore directed to increase not only the efficiency of the production but also the quality, both in the traditional and actual sense. Shell quality, tenderness of meat, fat amount, colour and freshness, are well observed, but also characteristics like insaturated fatty acids, residues and absence of contamination.

Frequent egg collection, especially to the end of the laying period, and the application of adequate cage constructions and egg handling devices are reducing the amount of down-graded eggs. Egg transport and packing on the farm in clean egg trays and adequate egg containers are of utmost importance.

About 1979 an increasing preference was shown to fresh products in stead of frozen broilers, together with an increasing demand for broiler parts. The equipment for those purposes in now available.

A further consumer requirement is the safety of the product, being free from contamination and residues from additives. There is a growing concern about contamination with Salmonella. In order to prevent this as much as possible the industry is orgnizing a " top-down " control along the chain of breeders, hatching egg suppliers and hatcheries. Medications and additives can also be followed and registered carefully along this chain. The possibilities for such a

control by rules of Good Hygienic Practice for eggs are in study now. In this respect an integrated production is of great help. The first experiments are promising.

Apart from the contamination possibilities during the production there is a great danger of contamination during the processing, so hygiene is in this stage of paramount importance. Much emphasis is laid on the supply of clean unfed live birds and quality control of the slaughtered birds at the processing plant.

Breeding developments.

Breeding research is still directed to a more efficient production. Emphasis is now laid on the improvement of the feed conversion ratio in laying hens, especially on the factors affecting the so called residual feed consumption (that part of the consumption, which cannot be explained by production or weight).In broilers selection on feed conversion contributes also to leaner birds. Investigations are made as to the genotype-temperature interaction in the regulation of feed intake. The physiolgy of broilers is also subject of study in relation with the occurrence of Ascites(water belly).

In order to avoid too much wet droppings in the context of the concern for the environment, research is done on the hereditary aspects of the amount of dry matter in droppings.

Noteworthy are the attempts to accelerate the process of selection for improvement with the help of biotechnological methods. However thers is still a long way to go in this respect.

Husbandry methods.

After 1960 new housing systems were developed. Initially floor houses with partly or complete slatted or wire floors. However, after 1965, battary cages were introduced and very rapidey adopted. At the moment more than 90% of the laying hens in the Netherlands are kept in cages, although attempts are made to find an alternative for the system, due to criticism from the society.However cages are still considered as the most efficient and safe system. Presently tier

batteries are mostly preferred.

In the meantime the size of the poultry houses increased. The shape of the houses did not change very much. Nearly all houses are environmentally controlled. In the seventies deep pit or high rise houses have been built, but this system did not satisfy under our climate conditions. Both for the laying hens and the broilers much attention is paid to maintaining an adequate environment.

Climate factors, such as temperature, relative humidity (RH) and air velocity are to a large extent interrelated. They cannot be considered seperately. Moreover there is a large interaction with other factors such as the system of housing and nutrition. That is why we often refer to the "effective" in which, besides the environmental temperature also the prevailing levels of RH , air velocity and the nature of the environment itself, e. g. the floor, is involved. We must be aware of the fact that the microclimate, in the immediate surroundings of the bird, is decisive.

The temperature (at bird's height!) affects the energy requirement for maintenance of the birds and thus the level of feed intake. At high temerature levels the RH is also of great importance. That is why some researchers are in favour of measuring these factors at the same time in one parameter : the enthalpy or heat load of the air. But the temperature humidity index, in which both factors are combined, might be as valuable.

In a given poultry house this complex of climate factors must be continuously adjusted to the environmental conditions. Proper control of all devices involved by the farmer himself would take a lot of time and attention. Fortunately this job can be largely taken over by computers. These are not only capable to memorize the desired levels of the interrelated climate factors, but they can also register the actual measured values in order to adjust the controlling devices accordingly. And this is not all. Computers may also control lighting schedules, feed and water supply, weighing of feed and chickens and egg counting. At the same time farm data can be registered, e.g. by means of a hand terminal, so that the management is able to see the effects of the measures involved. Finally various management programs can be used to compare farm records to former results or

those of other farms and to optimize the financial outcome.

The poultry association in the Netherlands is taking care of uniform rules in order to secure an adequate comparison between participating enterprises.

As already mentioned, air and water pollution are a matter of great concern nowadays. Therefore much attention is paid to find suitable methods of producing dry manure in the poultry house and reducing NH3 emission to the air. One of the methods to achieve this is bringing a stream of fresh air direct to the manure belt underneath the cages at the same time bringing fresh air near the birds.
At the Spelderholt Poultry Research Institute housing systems are tested as to their NH3 emission and the inherent effect on the quality of the birds. Normally the emission starts after 3 weeks and may give rise to skin lesions, when the litter is not kept dry enough (min. 70% d.m.). A lower housing density and more ventilation may be useful. Also attempts are made to find a suitable floor for broiler houses in combination with a manure removing belt. The process of the uric acid break down in manure is studied. Even the possibility of water restriction in laying hens is under investigation. In broiler houses wastage of water should be avoided.

Nutritional research and development.

Increasing the efficiency of the feed is still a subject of study in nutrition. At the Agricultural University much attention is paid to the technology of feed manufacturing. Besides the digestable amino acid requirements in the growth period of chickens is investigated.

New developments in feed formulation are taking place ; phase feeding is again introduced, not in the last place because of the requirements from the environmentalists. The Nitrogen (N) and Phosphorus (P) contents of the feed can be reduced by increasing the digestibility of amino acids and the availability of P through the addition of microbial phytase, Both N and P contents of the feed are kept as low as possible again in order to restrict the deposition of these minerals in the environment. Besides the contents of these elements in the feed of laying hens also Calcium (Ca) can be adapted

to the changing requirements during the producction period.

In this way we are supplying more than one feed in one production period, which means a form of phase feeding. Some years ago phase feeding was already introduced, but not adopted by the feed manufaturers because of the extra costs of a larger assortment of feeds. With the applied safety margins it was not necessary either, but times have changed.

Broiler feeds are also differing now during the growing period. Since 1982 coccidiostats are forbidden during the last days of this period, so that a special finishing feed had to be introduced, and, because of a lower requirement of protein, Ca and P to the end of the growing period, here also phase feeding has been introduced.

Feed is the largest cost item. Therefore in practice a lot of attention is given to the possibility of exact dosage of feed to individual birds, not only to safe as much feed as possible, but also to supply each bird with the adequate amount of feed. The techniques to achieve this are now available.

Disease prevention.

The increased concentration of birds in large units together with the concentration of poultry farms in certain regions of the country have brought about a high infection pressure. Therefore the prevention of diseases by hygiene and vaccinations has got a wide intrest. An organized approach by means of Health Services has enormously constributed to good results.

Summary and conclusion.

The poultry husbandry in the Netherlands has shown a continuous growth from 1900 onwards. This growth accelerated after 1960 , when new efficient techniques became available. Since then a lot of experience and know how has been obtained.Our experience makes it possible to support developments in the poultry industry elsewhere by the most modern techniques and devices. Research and development are still directed on increasing efficiency,

but to data also the requirements of the consumer have to be met in the form of more attention to the quality of the products, product safety and the environmental implications of modern production methods.