

Part 1

Historical introduction

1. A short history of livestock production

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1.1 Introduction

The origin of livestock production dates back about 11,000 years ago (after the last glacial period) when man started to domesticate sheep. This is quite a short period compared to the beginning of the evolution of humanity that dates back about 14 million years ago. This means that humans and their humanlike ancestors survived for millions of years without domestic animals (Reed, 1984) eating plants (that were opportunistically collected) and animals (that were systematically hunted) as the most important food source. With the domestication of animals and the cultivation of plants (somewhat less than 11,000 years ago, also addressed as ‘the Neolithic revolution’), a fundamental change in the development of humanity happened (Benecke, 1994).

Taming and domestication (Mason, 1984) is also the story of a successful symbiosis between animal and humans which presumably started simply by recognising advantages for both. The animal received regularly food and protection from humans, and humans benefited from easier access to the animal and its valuable meat, bones and skins without the need for hunting. Later animals were domesticated for milk, wool, motion power, warfare, sport and prestige (Reed, 1984). During this continuing ‘co-operation’ over thousands of years; both animals and humans changed their living habits and the animals in particular their phenotype, reproductive, growing and production abilities while losing some of their cognitive skills that were not required in captivity any more (Herre und Röhrs, 1990). The authors report that the brain of domesticated animals weighs less (in pigs up to 33%) than that of their wild ancestors. This history of domesticated animals can be divided into several time periods or ‘ages’ of flowing development mostly influenced by humans introducing new technologies in feed production, security, breeding and housing.

1.2 Livestock production in the ancient times

The first evidence of a domestic animal (i.e. dog), is dated between 14,000 and 12,000 years ago (Turnbull and Reed, 1974), and the earliest known typical (as we define it in most parts of the world) domestic food animals were sheep somewhat less than 11,000 years ago. We have little, if any, evidence that the cultivation of plants began earlier than 9,000 years ago.

For quite a long period of time, the relation between man and its environment, including plants and animals was a loose coexistence, which became more and more intensive when people settled and were able to increase plant production with increasing crop yield. Different from all other animals, humans did not adapt themselves purely to their environment, but started to ‘use’ the environment to their purposes (Zeuner, 1963). During the early times humans were a pure ‘food-gatherer’ (Palaeolithic period, approx. 14,000 to 12,000 years B.C.). This is the time when

probably the dog became the first animal to live permanently with man helping with guarding, defence and hunting (Turnbull and Reed, 1974). Later (Mesolithic period, approx. 9,000 years B.C.) humans relied more and more on hunting, fishing and collecting shell-fish, grubs, fruit and wild vegetables. This time lasted for several thousand years again during which humans did not influence their natural environment to any noticeable degree (Zeuner, 1963). This changed in the Neolithic period (from about 8,000 to approx. 3,000 years B.C.) and definitively with the advent of the Bronze Age (starting between 3,500 and 2,500 years B.C.) when more systematic farming for food production was developed. These developments took many generations and long time-periods.

The earliest traces of farming are typically found in the Middle East region where ceramics could be dated back to more than 8,000 years B.C. The Bronze Age also started 500 to 1000 years earlier in the Middle East than in North Africa, followed by South, East and Middle Europe. These developments were probably also substantially influenced by the globally changing climate in the post-glacial times to Subboreal (approx. 3,800 to 500 B.C., Benecke, 1994) and Subatlantic (since about 500 B.C. till today) with moderate temperatures and sufficient rainfall allowing settlements to develop with plant and animal production. There are numerous practices known from ancient Egypt in taming and domesticating of various animal species including sheep, goat, cattle (Zeuner, 1963) as the Egyptians left pictures of standard animal husbandry practices (Reed, 1984). Beef cattle were kept indoors with hand feeding and stalls were equipped with drainage for urine (Figure 1.1, after Benecke, 1994).



Figure 1.1. Wooden model of a beef cattle house in ancient Egypt, tomb of Mektire, 11th dynasty, 2134-1991 B.C. From: Benecke (1994) (after H.W. Müller, 1970) modified (photo in Department for History of Veterinary Medicine and Domesticated Animals. In: Roemer- und Pelizaeus-Museum Hildesheim, Egypt collection, Germany).

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The high standard of horse husbandry is illustrated in Figure 1.2 showing an ancient Greek stable for 6 horses found in Sicily providing drainage in the floor, individual feed troughs, slits for halter-straps and ventilation openings above the troughs (from Klimmer, 1924). Evidently, housing standards for horses in ancient Greece were not much different from what we provide for horses today.

During the time of the Roman Iron Age and the migration period (1st to 6th century AD) food supply in Middle Europe and South Scandinavia was predominantly based on crop and animal production (Benecke, 1994). Reports and archaeological findings indicate that the dominating farmed animal was cattle (56%) followed by pig (28%) and sheep/goat (16%) (Benecke, 1994). The distribution of species on the farms was dependent on region and living conditions. Benecke (1994) reports that unlike in the inland areas; sheep was dominating the Dutch coastal regions. His explanation is that sheep were protected by the salty and dry soil conditions from contracting sheep liver fluke because these conditions hampered significantly the development of *Galba truncatula*, the alternate host of sheep liver fluke, compared to the inland sweet water regions. Thus, sheep thrived in the coastal areas.

In Germanic settlements along the River Weser reconstructions of farm buildings gave indication about the development of farms and the number of housed animals in that region (Benecke, 1994, cit. Ennen and Janssen, 1979). While in the 1st century B.C., five farms with a grand total of 98 cattle (in 54 in-house pens) were identified; these numbers increased in the 1st century AD to 8 farms with 176 cattle (in 98 pens). In the 2nd century numbers further increased to 19 farms with 377 cattle (in 218 pens) and in the 3rd century to 19 farms with 443 cattle in 267 pens. With increasing animal farming the importance of hunting decreased considerably in the regions around the North and Baltic Sea. From bone findings, it is known that hunting of wild animals contributed only 0.5% of all nutritional intakes together with fish that played a considerable role in the diet of humans especially in coastal regions. However, inland the proportion of hunted animals in the diet could rise to about 5% depending on region (Benecke, 1994).

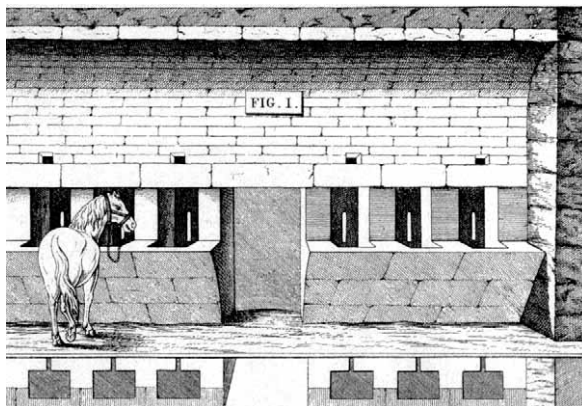


Figure 1.2. Horse stable in Sicily with drains in the floor, individual feed troughs, slits for halter-straps and ventilation openings above the troughs (from Klimmer, 1924).

Interestingly prices reported from that time showed that chicken were the most valuable livestock. Under the rule of Emperor Diocletian (245-316 AD) a pair of chicken used to cost around 60 denarii, a pair of pigeons 24, a pound of pork 12 to 24, while beef, mutton and goat were the cheapest meat with about 8 denarii per pound (Benecke, 1994). The high value of chicken may have been also the reason for relatively large flock sizes.

The Roman writers Varro and Columella (1st century AD) (in Benecke, 1994) described poultry houses for 200 birds. The houses consisted of three different parts, which were connected by a service room for the animal attendants. The houses were illuminated by natural light through wooden windows with willow branch nettings and equipped with elevated perches and nests made of fibre baskets mounted along the walls with landing spaces in front of the nests. Openings in the wall allowed birds to use the outdoor area, which was protected by a wall and a net against predators 'by foot' and from the air. Columella recommended the provision of sand and ash for dust bathing in some part of these areas protected by a roof. He gave advice to farmers, urging them to provide sufficient space for animals like sheep, goat, mare and foal when kept indoors and protect them from cold in winter. He also advised ancient livestock producers to build stables with perforated floors for draining urine and faeces, so conditions in livestock buildings can be kept dry.

Pigs were kept predominantly outdoors most of the year (Benecke, 2003). Shelters were used only in wintertime or for sensitive animals like pregnant sows. Columella (in Benecke, 2003) reports that pregnant sows were kept indoors in separate pens made of wood. The walls were 1.2 m high. A bar at the entrance of the pen was high enough to allow the sow to walk in and out, e.g. for foraging while the piglets could not go across the bar. Similar systems are recently discussed in modern animal production in order to improve animal welfare and avoid suffering of sows in the farrowing crates used typically on modern farms. It is interesting to note that thousands of years ago the advice given to farmers were quite similar to the advice given to modern livestock producers.

1.3 Livestock production in the Middle Ages

The husbandry and management systems used in Europe during the Middle Age did not differ much from the earlier centuries. Pasture farming continued (Benecke *et al.*, 2003). Cattle, sheep, pigs and other livestock were kept predominantly outdoors and had to forage for food on the fields, fallow land, meadows or in the forest close to the villages. However, changes happened gradually and parallel to political, sociological and technical developments. In the early Middle Age (6th to 11th century) large proportion of the population were engaged in agriculture. Around 1500 AD, it was still 80% of the population (Falkenberg and Hammer, 2006) that were directly involved in food production.

Christianisation progressed and the erection of feudal systems supported the spread of agriculture. However, these forces also supported the development of towns and trade (Falkenberg and Hammer, 2006). More and more land was cultivated. Between the 8th and the 13th century, the area of arable land doubled from about 3 to 5% to about 6 to 10% (Poprawka, U., personal communication). By abandoning 'two-field' use of the land (i.e. simple rotation between fallow and

cultivated portions of the land) and the introducing the so called three-field rotation; the amount of fallow land was reduced from 50 to 33% and the efficiency of food production was dramatically increased (Poprawka, U., personal communication). Numerous technical improvements were also introduced like iron horse shoes, which enabled the horses to pull carriages and loads 4-times heavier than before (Poprawka, U., personal communication). The village blacksmiths became important professionals and their skills and knowledge formed later the basis of horse medicine (Giese, 1994). As an example, the University of Veterinary Medicine in Hannover was founded in 1778 as 'Rossarzneischule' (school for horse medicine) by King George III, King of Great Britain and Elector of Hannover. Many more inventions were introduced in practice like iron-enforced wheels for carriages, iron armoured ploughs which all helped to increase the efficiency of agricultural production. As a result, between the 7th and the 14th century the population in Western Europe rose from about 21 to about 71 million (Falkenberg and Hammer, 2006). Unfortunately, this development was decelerated by some hunger crises and plagues waves (Black Death).

The consumption of meat enjoyed increasing popularity in the Middle Ages. There are reports from France and Sicily providing average consumption figures per person and year. The highest consumption was reported for a peer in the province of Auvergne consuming about 100 kg meat. In the town of Tours the meat consumption reached 43 kg while in Carpentras the consumption was with 23 kg only half (Falkenberg and Hammer, 2006). Even in Sicily (where fish also contributed significantly to the menu) as much as 15 to 20 kg of meat was consumed per person (Falkenberg and Hammer, 2006). These figures are very significant events by modern standards.

In the course of the centuries; pork became more and more popular in many parts of Central Europe while in the North Sea and Baltic region sheep and cattle were dominating the menus (Benecke, 2003; Falkenberg and Hammer, 2006). For example, it has been documented that Emperor Charles the Great (742-814) gave order that pork and pork products should always be available on his farms (Brandsch, 1990) and the Earl of Angoulene in France apparently offered 120 pigs (roasted pork) to his guests during a banquet (Falkenberg and Hammer, 2006). From pig skeletons found in regions from the Baltic Sea, Pomerania, central Poland and Silesia it can be concluded that in the High Middle Ages (11th to 13th century) about 50% of the domesticated animals on farms were pigs (Benecke, 1994). However, these pigs looked quite different from our pig breeds today and resembled much their wild ancestors. Usually swineherds guarded the pigs of a village. Particularly in autumn, the pigs were driven to nearby forests and fed with wild acorns. A famous painting of Albrecht Dürer shows a swineherd with his dogs and the horn which he blows in the evening to gather the herd before returning to the village (Figure 1.3). These swineherds were also responsible for maintaining the health of the pigs (Falkenberg and Hammer, 2006). This might have been the starting point of 'swine veterinary medicine'. In some regions, the pigs carried bells so they could be located easily and the noise of the bells would also protect them from predators (Rinesch, 2001).

Housing of animals in the Middle Ages was mostly reserved for farrowing sows or for other livestock in wintertime when feed supply was limited outdoors. Regularly in autumn, numerous animals were slaughtered (1) to ensure sufficient food supply for the family and (2) to reduce the number of animals, which had to be housed and fed during the cold season. However, with



Figure 1.3. *The prodigal son as swineherd* (Albrecht Dürer 1471-1528).

the growing demand for meat and the increasing crop production, the space for pigs and cattle foraging in fields and forests became limited and animals were increasingly kept indoors over longer periods (Falkenberg and Hammer, 2006). It was reported that herds of 150 pigs were kept on some farms (Czerwinski, 1964, in Falkenberg and Hammer, 2006). However, pigs were not only kept on farms but also in towns where they were used as waste converters and many bakers for example kept pigs in the backyard and fed them with the leftover of wheat, flour and bran (Falkenberg and Hammer, 2006).

1.4 The new age of livestock production

Animal farming did not change very much between the end of the Middle Ages and the 17th century. Its development was always closely related to the progress and productivity of plants production. Three-field rotation continued as the most important production system. Only in some areas like Silesia and Saxony four-field and five-field production systems were introduced in order to reduce the amount of fallow land (Seidl, 1995). Consequently, less pasture was available for livestock production and farm animals were pushed back in favour of cultivation of cereals, beets, cabbage and other fruits (Seidl, 1995). There was no specific animal feed production or indoor housing during the summer. Animals were fed according to grazing rights in summer

and the farmers tried to nurse the livestock through the winter on rather poor diets (Seidl, 1995) such as foliage and small twigs. The low prices of meat compared to cereals did not provide any incentive to invest in the intensification of livestock production (Seidl, 1995). Comberg (1984) gives an example of the development and relation of the prices for rye and meat (relative figures are shown) between 1740 and 1806 in the town of Berlin (Table 1.1).

The transformation of animal farming towards higher productivity happened only when crop rotation was introduced in agriculture, starting first in England (Seidl, 1995). This system of growing a different crop on the field every year, used the land more efficiently and opened the way for systematic fodder production or specific pastures for grazing (Seidl, 1995). Depending on the farm management and the quality of the land; animals could be kept indoors or on specially prepared pastures in summer. In the United Kingdom, Adam Smith (1776, in Comberg, 1984) was quoted saying: 'a grain field of moderate fruitfulness produces a larger amount of food for the population than the best pasture of the same size.' There were even proposals to abandon animal farming completely which was however not possible because farm animals were desperately needed as draught animals and their manure as fertilizer in crop production (Comberg, 1984). All these discussions and developments opened the way for non-grazing (intensive) animal production systems. Albrecht Thaer (1752-1828), one of the most influential advocates (Klein, 1969) of non-grazing animal production systems gave five advantageous reasons (Seidl, 1995):

1. reduce the demand for land as opposed to pastoral farming;
2. the manure can be prepared and stored indoor and than can be used in a directed way as fertilizer;
3. the cultivation of fodder in the system of crop rotation avoids idle fallow land;
4. livestock can be provided with sufficient and nutritive feed throughout the year;
5. animal health is not negatively affected when the animals have temporarily access to a free-range area (paddock).

However, others criticised the so-called 'all-year non-grazing systems'. Walz (1867, in Seidl, 1995) recommends to rotate grazing on different pastures and he points out that cows gave more milk when kept on meadows. Settegast (1878, in Seidl, 1995) refers to the situation in England where indoor keeping of cows during summer was not successful. Interestingly he calls for scientific research to clarify the relative excellence of grazing as compared to non-grazing systems.

Table 1.1. Comparison of prices for rye and meat between 1740 and 1806.¹

Year	Price of rye	Price of meat
1740	100	100
1780	125	120
1790	120	124
1806	300	254

¹ Figures are related to prices in 1740 = 100. No currency given, relative numbers.

1.5 The development of livestock production since the 19th century

With the introduction of modern science in agriculture from the middle of the 18th century, scientists started to systematically explore opportunities for further production increases in both plant and animal production. This was necessary because of the increasing demand for food for an increasingly urbanised European population. The scientists tried to understand the relationships between soil, plant, weather and fertilisation and recognised the importance of good nutrition and appropriate housing for farmed animals. Examples are Albrecht Daniel Thaer (1752-1828) or Adam Smith (1723-1790). Johann Christian Polycarp Erxleben (1744-1777), Professor at the University of Göttingen, wrote about the importance of adequate stocking densities. He argued that livestock species should not be housed in primitive shelters. He recognised that in overstocked animal houses the air is polluted with high concentrations of noxious gases generated by animals and the manure. He argued that it is better to have barns with high ceilings and with openings for ventilation. This may decrease the temperature in the house, which is not detrimental for sheep and cattle, but will improve air quality. He also recommended that animals need to be provided with day light in barns which improves their health and welfare (citations from Comberg, 1984). These recommendations (while not earth-shattering by current standards) clearly demonstrate that agriculture scientists tried to apply the rules of natural science in animal farming.

The 18th century was the time of devastating waves of rinderpest in Europe. Around the year 1765 millions of cattle died, for example in the Netherlands 395,000, in the East Friesian region 116,277 and in Denmark 255,000 (Nussbag, 1954). Between 1754 and 1755 about 70,000 cattle died only in the English counties of Nottingham and Cheshire. The government decided to kill all sick and suspected animals – 80,000 in total. This drastic measure stopped the disease and the infectious agent died out for a long period in the United Kingdom (Nussbag, 1954). This was the origin of the eradication policy for similar plagues even today. The large plague put veterinary medicine in the focus and many Veterinary Schools were founded across Europe, e.g. in Lyon 1761, Alfort (close to Paris) 1764, Vienna 1765, Hannover 1778 and London (Royal Veterinary College) in 1791.

In the following years, the number of livestock rose continuously. In 1800 about 10 million cattle were counted in the area of Germany (German Empire). This number rose in 1913 to nearly 21 million, and the pig population increased from 3.8 to 25 million during this period (Comberg, 1984). In 1950 the numbers of cattle and pigs on the area of then West-Germany reached about 11 million and nearly 12 million, respectively. In the following years livestock production fundamentally changed with the advent of intensification. The number of dairy cattle decreased to today 3.5 million with very high milk production and pig and poultry production increased. This steep increase of pig production is demonstrated as an example in Figure 1.4 showing the number of pigs kept in a district of only 800 km² in the northwest of Germany which today belongs to the most productive and prosperous rural areas in Germany.

This 'pig curve' mirrors the political and sociological developments over a period of 150 years, indicating the steady increase from the second half of the 19th century. The boost in pig numbers around the 1890's coincides with a strong boost of economy. The slight depression in pig numbers

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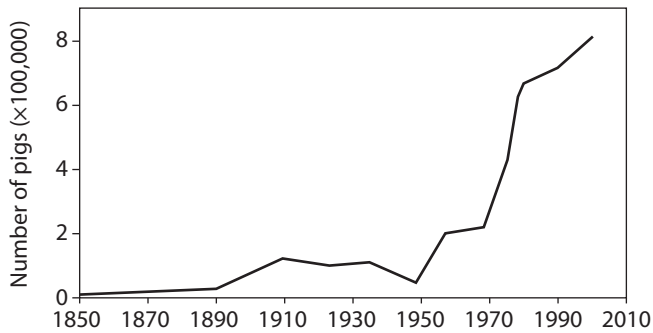


Figure 1.4. Development of pig production in a district in the northwest of Germany, since 1852 (area approx. 800 km²) (after Klön and Windhorst, 2001).

caused by the first world war and the deep recess after the second world war followed by a steep recovery can all be seen on the graph. The strongest increase can be observed from about 1970 when new and intensive husbandry and production methods were introduced, slowing down in recent years (Bäuerle and Tamásy, 2012). This is also reflected in the world meat market which rose by a factor of four between 1961 and 2005 from 60 million tons to 240 and expecting a steady increase in the future (www.fao.org). The same applies to poultry production (Figure 1.5) which came from a low level and rose by a factor of more than ten. Poultry meat showed the highest growth during the last 35 years (Windhorst, 2006). At the same time the number of poultry farmers dropped from nearly 3.5 million to a few 100,000, e.g. in Germany (Klön and Windhorst, 2001). Actual figures show that the shrinking of the number of farms is continuing. Between 2007 and 2010 about 22,300 German farmers gave up (ADR, 2012) most of them renting out their land to bigger farms. In spite of shrinking farm numbers in Europe, the number of farm animals reached a new world wide high with 68.8 billion poultry, 11.8 billion ruminants (cattle, sheep, goats) and 1.5 billion pigs in 2010¹.

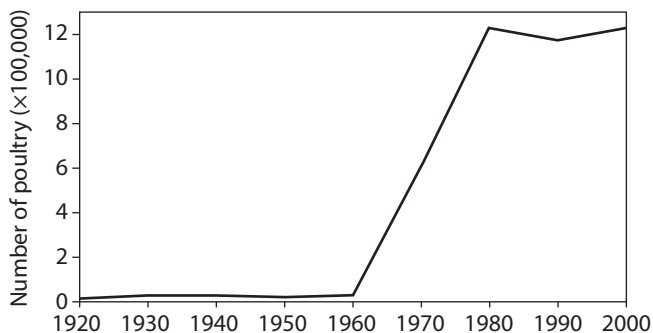


Figure 1.5. Development of poultry production in one district in Northwest Germany, since 1920 (area ~800 km²) (after Klön and Windhorst, 2001).

¹ www.statista.com/statistics/182114/global-stock-of-domestic-and-farm-animals-2010.

1.6 Livestock farming today and in future

The development of animal production in recent decades can be characterised by intensification and specialisation (Hartung, 2000).

Intensification means indoor animal housing all year round ('non-grazing'), high animal densities, a high degree of mechanisation and automation (e.g. in feeding, water supply, manure removal and ventilation), a low labour requirement and often a small air volume in relation to the number of animals in the housing unit. In the European Agreement on the Protection of Animals in Animal Farming this is defined as follows: 'modern intensive animal farming systems are systems in which mainly technical facilities are used that are primarily operated automatically and in which the animals largely depend on the care and supply of man.'

Specialisation means that only one animal species, specially bred for the purpose, is kept in specialised buildings on the farm. The consumers often have problems recognizing this animal production as the general population still largely associate farming with traditional concepts of a farm on which several animal species, from dairy cows to hens, are kept. The catchword 'animal factories' then spreads quickly and complaints are voiced that animals are simply considered as 'animal machines' (Harrison, 1964) under purely commercial conditions. In general terms, 'specialised intensive animal husbandry' is often interpreted as 'mass animal farming' with all its negative connotations. On the other hand, consumers readily take advantage of the economic benefits created by recent developments in animal farming as in some parts of continental Europe, one kg of pork can be purchased ready for just a few Euros.

In some regions of Europe, like the North-West Germany, southern parts of the Netherlands and in the north of France this intensive animal production is so concentrated that it can cause environmental pollution via odours, ammonia, dust, micro-organisms and bio-aerosol emissions, triggering complaints from neighbouring residents (Hartung and Wathes, 2001).

Another characteristic of this intensive animal production is that ever fewer persons are employed in this sector. Therefore, the complex work procedures used in modern livestock production are not known or increasingly misunderstood by the general population and thus animal production practices are losing popular support. As an example, in the year 1900 an average German household had to spend about 57% of its income on food, but currently food expenditure has been reduced to 14% (Statista, 2012). For the first time in human history, Europeans do not need to worry about sufficient food supply. The concerns of the public are increasingly directed to other subjects like the welfare of the animals, the safety of the food products and environmental pollution. For example, recent reports demonstrate that significant quantities of antibiotics are used to aid animal production in many European countries (Grave *et al.*, 2010). An actual survey unveiled that in 2011 about 1,734 tons of antibiotics were applied in animal farming in Germany (www.bvl.bund.de). Thus, consumers are calling for a sustainable livestock production that will enhance animal welfare, food safety without jeopardising environmental sustainability (Hartung, 2000).

Originally, the term ‘sustainability’ was used to mean a management principle in forestry, that ensured that the volume of timber harvested would not exceed the volume that can be re-grown on a renewable basis (Altieri, 1994). In principle, sustainability can also applied to animal farming. However, that also means that the livestock producers have to meet the demands and expectations of the consumer and the society. It is no longer enough to offer sufficient and cheap food. Ethical aspects of livestock farming gained more and more attention. To reconcile the ‘split’ between livestock producers and the society is an important task for agriculture professionals currently.

The different and interconnected aspects of modern animal production are represented in Figure 1.6. It is quite clear that modern animal production practices should improve animal health and welfare. The presently still widely used ‘man-made production environments’ (Wathes, 1993) must be replaced by systems which meet the requirements of the animals and satisfy their behavioural needs. When looking back in history, it is astonishing to see that the legislation implemented by the European Union to protect the welfare of laying hens in intensive production actually resemble closely the recommendations that were written up in the first century AD (see Columella).

Animal production will be successful in the future and will succeed in reconciling the different requirements and social demands placed upon it, such as the maintenance of high level of animal health and welfare, consumer safety and environmental protection. Loose housing systems for cows and free range systems for laying hens are being introduced. Unrestricted farrowing crates for sows are under investigation in several countries (Fels *et al.*, 2012). The future of animal production in Europe will depend very much on the cooperation between all parties involved such as farmers, agricultural scientists, engineers, veterinarians, retailers and consumers. When these parties will develop an understanding of each other and the important economical constraints of

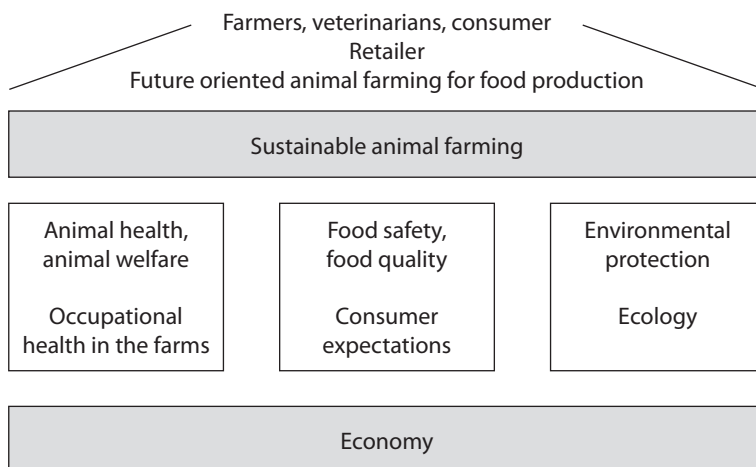


Figure 1.6. Scheme of a future oriented sustainable livestock production (after Hartung, 2012).

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animal farming (which forms the base of any production), then collaboration will deliver benefits to farmers, consumers, the environment and will improve the well-being of farmed animals.

1.7 Conclusions

This chapter reviewed the developments of animal farming from the ancient days until present times, mainly concentrating on the Central European region. It has been established that humanity survived for many millennia by hunting and gathering food without farmed animals. Only with the beginning of domestication some 14,000 years ago animals and man started to live in closer association. First sheep and dogs were domesticated. With progress in systematic plant selection settlements were founded and more animal species were domesticated. Horses for transport and warfare became indispensable parts of human life. The growing human population was nourished increasingly by cereals, which could be harvested and stored. Eating meat was typical for aristocrats and rich people. For a long time farm animals were insufficiently fed and poorly housed particularly in winter, which reduced their efficiency and importance for the survival of people. Only with the introduction of new management techniques like crop rotation and organised harvest, the storage of fodder became a possibility. The availability of food and feed all over the year formed the basis of the growth of the human population. The number of farm animals increased continuously over the centuries to feed the workers in the factories of the industrialised world. With increasing income, the consumption of meat also increased. The highest increase in farmed animals occurred between 1950s and 1980s coinciding with the advent of intensive livestock production. Particularly pig and poultry production became independent of the surrounding land because of feed imports from other parts of the world. Large farming enterprises with many 1000 of cattle, 10,000 of pigs and 100,000 of poultry became the norm in animal production. This intensification of production made meat, milk and eggs so cheap that everybody in Europe could afford it easily. The cost of nutrition for an average German household dropped from about 57% in 1900 to about 14% today. An increasing number of people feel that these low prices are achieved on the expense of the welfare of the animals, the quality of the environment and by using significant quantities antibiotics in order to keep animals healthy in large numbers.

In order to feed a fast growing world population it is necessary to find the balance and ensure a sustainable future for livestock production which will guarantee high standard of welfare for animals, safe food for humanity, a clean environment for all to enjoy and sufficient income for the livestock producer.

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