

Economic Aspects of Animal Welfare

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Abstract: Economic activities are not conducted in a vacuum; external factors may influence production efficiency, and the activity itself may also result in positive or negative impacts. Although disregarding animal welfare aspects appears to hurt only animals that are harmed as a consequence, banning animal torture is as significant a social interest as combating environmental pollution. Therefore, countries and relevant organisations of certain countries (such as the European Union) regulate via provisions the enforcement of animal welfare aspects with regard to economic activities. Below, economic activities covered by animal welfare regulations and the impacts of animal welfare requirements on economic efficiency will be analysed. In most cases, fulfilling such requirements imposes higher costs for the company at issue and, thus, has an inflationary effect on prices similar to levying a tax. As a consequence, animal welfare regulations generally jolt enterprises from the usual minimum cost-maximum return intersection, so animal protection may appear costly at first. However, in the long term in most cases, they do not bring lower revenues because applying the new – often more expensive – method or technology boosts productivity and because the loss of competitors due to compliance failure may increase the market share for complying companies. The consumers' behaviour is a paradox: on one hand, they are becoming more and more aware of the environmental impacts of their daily lives, whereas on the other hand, concern for the ethical treatment of animals does not always mean changes in purchasing habits. If we look at the production side, animal healthcare statistics prove that the large majority of losses in livestock breeding (mortality, compulsory slaughtering, diseases, poor reproduction and body mass index (BMI) results, medical expenses, etc.) are not caused by obligate pathogens. Most losses are the direct result of diseases due to unfavourable conditions related to animal breeding, feeding and raising or other external factors (power failure, damages from hail, etc.). Through the appropriate keeping and adequate care of animals, sensible animal welfare attitudes and practices may prevent material losses.

Keywords: animal welfare; economics; regulations; negative externality

1 Effects of Animal Welfare: Theoretical Basics and Advantages for Society

Since WWII, animal husbandry has undergone profound change, as demand for food from animals has increased sharply. Traditional extensive farming and breeding has been replaced by intensive, profit-oriented systems. Overcrowdedness, a stressful environment and extreme separation cause behavioural and psychological stress symptoms, which eventually lead to problems that are also economically calculable, such as the lack of controllability and predictability [44]. What was previously part of average farm life is now aggregated into commercial enterprises, which have very little concern for individual animals. Society uses animals in many ways to support our own interests and well-being. The consumption of meat is rising sharply worldwide. Particularly fast growth can be observed in the demand for poultry meat, which has consistently increased at approximately three times the rate of population growth over each of the past five decades. Growth of world egg and milk production is less drastic, but the trend is evident here as well (Figure 1, [20]). The food industry plays a significant role in the countries' national economies. All in all, concern for animals is evident now throughout many societies.

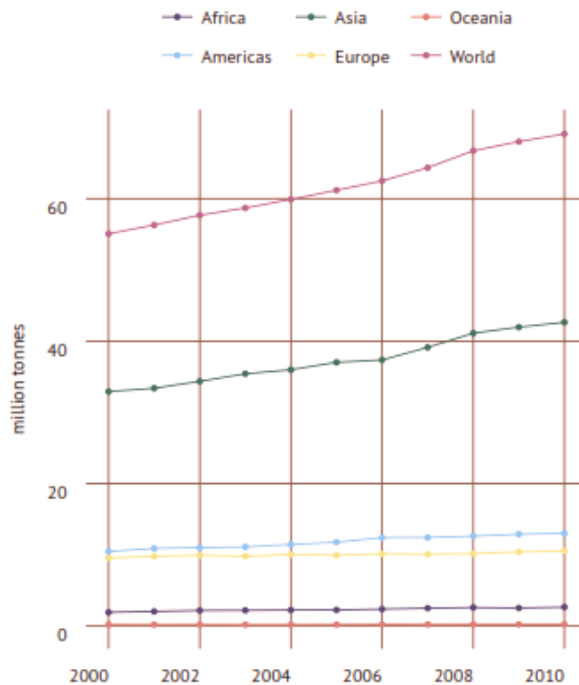


Figure 1
World egg production 2000-2010 [20]

There is a conceptual scale on which the level of animal welfare can be measured. Below a certain point, the welfare standard would be regarded as totally inconsistent with the ethical values of society, and all reasonable people would feel bad if farm animals were treated in such fashion. Animal welfare up to this threshold is therefore a ‘public good’ — a benefit that government has a responsibility to ensure. At the upper end of the scale are levels of animal welfare that only a minority of people would consider important; the economic value attached to it can be treated as a private good that government has no responsibility to provide [31].

Violation of animal welfare norms, disregarding animal torture and animal welfare – just like any other social and criminal deviations – are not isolated phenomena, and they do not take place in a vacuum. The way we treat animals has a complex relationship with morality, religion, crime, societal development and, last but not least, the economy. Economic principles can and should have an important role when new, market-driven and other approaches are developed to improve farm animal welfare, as there is a limit to the improvements capable of being secured by tightening legal improvements [11].

1.1 Legal Background

The utilitarian view indicates that livestock have primarily a ‘use value’. However, societies accept ethical presumptions that confer other values on many features of the biological world. Thus, farm animals can have an additional ‘non-use value’.

The main methods for imposing minimum necessary standards are by legislation, regulation and enforcement. These are the only means of ensuring all livestock keepers provide the public good values [31], which is the reason most countries have introduced animal welfare regulations. These regulations differ significantly regarding their contents, forms and execution mechanisms.

In certain countries (e.g., Germany), animal welfare has been made a constitutional issue. Primary legislation belongs to the sphere of competence of the Parliament or the Congress, whereas in the course of secondary legislation, the relevant government bodies frame detailed regulations [6].

Legislation depends also on the traditions and history of a certain country. Austria, the Netherlands, Sweden and Switzerland are among the countries with the most highly developed animal protection systems.

The issue of animal welfare in Hungary has achieved the regulatory status it deserves after the Animal Protection Act was adopted in 1998, and animal torture was defined as a criminal offence in 2004 [1-2]. Hungary’s accession to the European Union necessitated the introduction and application of the EU regulatory system, which prompted substantial changes in domestic breeding technologies.

Animal welfare has great significance in the European Union, partly due to the love of animals and the undisputable economic weight of the issue. Since the 1970s, several treaties have been adopted in Europe aimed at safeguarding the living conditions of animals on the grounds of the Five Freedoms of Animal Rights principle [43]. Although the five freedoms were originally developed from a UK Government report on livestock husbandry in 1965, the international animal welfare legislation is based primarily on the “Five Animal Freedoms” set out by Britain’s Farm Animal Welfare Council in 1979 [19]. On its grounds, animals must be protected from:

- hunger and thirst;
- pain, injuries and diseases;
- fear and negative stress;
- conditions limiting natural behaviour; and
- discomfort due to insufficient space, improper facilities or overheating.

In 1978, the European Council concluded a treaty on the protection of farm animals. Animals shall be treated in accordance with their natural needs and causing any unnecessary pain shall be avoided [12]. In the EU, time and again, new regulations are framed to be adopted and implemented. These aim to broaden and more precisely define animal welfare regulations, on one hand, and contain concrete requirements for law enforcers, stockbreeders and enterprises. Special animal welfare regulations have been framed, among others, for the caging of egg-laying hens [13] and the keeping of calves [15] and pigs [14]. If the provisions – as key determining factors of supply and demand – are modified and alter production figures, they will also result in a supply-demand shift; market prices and production quantity will change, which will subsequently impact society.

Concerning the issue of the necessity of animal welfare regulation, the key concern is not first and foremost intentionally inflicting pain, as such acts are atypical, but activities motivated by false interpretations of economic or cost efficiency. With regard to stockbreeding, the key problems may be the following:

- a) Confinement and an environment lacking stimulation, with subsequent effects, such as deformed feet or burns due to ammonia.
- b) Over-crowded environment, with all its adverse effects. The British ethologist John Calhoun examined the effects of an over-crowded environment in experiments with white rats, which showed dramatic alterations as a consequence: aggression, sadism, unrestrained sexuality and a high mortality rate [37].
- c) Physical abnormalities resulting from forced maturing (i.e., heart and lung deficiencies).
- d) Constant restlessness (i.e., animals cannot relax).
- e) Marked separation versus crowdedness. Separation deprives animals of advantages resulting from social bonding, which can lead, for example, to aberrational behaviour and diseases associated with breeding [21].

The most uncomplicated definition of welfare focuses on an animal's bodily functions and its reactions; accordingly, the welfare of animals is optimal when they do not display signs of stress [9]. The stress of farm animals has grave consequences also on the entire stock, as reproduction rates decline, production indicators deteriorate and production costs rise. Therefore, the timely recognition of stress and the introduction of countermeasures are essential.

1.2 Violation of Animal Welfare Regulations as a Special Negative Externality

The expression 'externality' (external effect) means that an activity by an economic stakeholder unintentionally and without legal consequences influences the position of another economic stakeholder. This also implies that externalities impact not only the costs or profits of the stakeholder at issue but also everybody else around him. Externalities may be categorised on the basis of their effect; they can be positive or negative, depending on their impact [10].

Environmental pollution is considered a negative externality, being an unwanted by-product of profit-oriented processes that has grave social consequences. By definition, environmental pollution is a development resulting from an activity or process that alters the composition or mechanism of environmental components (water, air, etc.). For example, if the quantity of some foreign substance in the air is already harmful for living beings and/or the share of original components (i.e., oxygen, nitrogen) changes significantly, then it is called air pollution. Environmental pollution may be physical (e.g., noise pollution), chemical (e.g., soil pollution) or biological (e.g., GMO) [25].

Although the failure to take animal welfare into consideration appears only to harm animals that fall victim as a consequence, banning animal torture is actually in the interest of the entire society, just like combating environmental pollution. In addition to moral reasons, this proposition also has a legal foundation, as the ultimate object that animal welfare regulation aims to safeguard is not animals but human beings and society. Hungary's Criminal Code, for example, currently regulates the crime of animal torture in Chapter XVI, among crimes against the public order and within that, among crimes against public safety [1]. Consequently, as animals are not legal entities, instead of the victimised animals, the regulations qualify the norms of social coexistence as the victim. Therefore, breaching animal welfare regulations and environmental pollution have something in common: both of them are negative externalities.

The violation of animal welfare regulations must, as a matter of fact, be listed among special negative externalities; as opposed to several cases of environmental pollution, its social impact – which is mainly a moral one – is hard to put down in numbers, and its economic damages are indirect. (Such a factor is, for example, the impact of reducing animals' suffering.) Furthermore, the reverse is true:

animal welfare is evidently a ‘public good’ externality, and there is an obvious role for government policy in establishing and enforcing standards. Farm animal welfare provides an economic value that is not adequately handled through the normal market processes surrounding livestock farming [24, 31].

Another issue worth mentioning is that levying per-unit taxes on environmental pollution has proven to be ineffectual in practice, as evaluating the damage caused faces serious obstacles. Due to the high number of variables and their complicated interactions in nature, a precise scientific evaluation of ecological alterations and their subsequent damages in financial terms is often impossible. Thus, the notion is becoming widespread that instead of a complicated damage assessment doomed to fail anyhow, there should be a socio-political consensus on financing the improvement of environmental indicators [30]. Thus, one can once again draw a parallel between environmental pollution and the violation of animal welfare regulations.

2 Effects of Animal Welfare: Economic Advantages and Disadvantages for Enterprises

“People, planet, profit”, also known as the triple bottom line, are the key factors that should be practiced in every move a company makes. ‘People’ refers to fair business practices toward the community. ‘Planet’ refers to sustainable environmental practices and environment-friendly solutions. ‘Profit’ is the economic value created by the organisation after subtracting the cost of all inputs [42]. From the point of view of economic analysis, farm animals are simply one of the resources of livestock production, subject to the same considerations as all other resources.

Before Hungary joined the European Union, it was a widely held view in the country that complying with animal welfare regulations and implementing related investment projects do not result in extra profits for farmers, as these have no direct economic advantages. However, even before EU accession took place, certain foreign markets only allowed the sale of goods produced in accordance with these regulations at prices that included domestic costs. As a result, compliance with animal welfare regulations became a precondition of entering a market. In addition, several large food chains (e.g., McDonald’s) pay special attention to the welfare of animals from which their products are made, and thus, they oblige their suppliers to observe a number of extra quality or technological requirements. Producers often endeavour to comply with the subscriptions of an animal welfare quality standard system because such systems increase the value of marketable products. Complying with certain standards is often rewarded with trademarks by food safety organisations (e.g., Global Animal Partnership, Tierschutz Geprüft). In Hungary, unfortunately, no such system has been introduced [39].

2.1 Paradoxes and Difficulties

2.1.1 Welfare-Productivity (McInerney) Model

The welfare-productivity model shows that beyond a point, higher welfare standards involve some sacrifice in livestock productivity cost. The shape of this curve shows that basic welfare improvements can be gained at little cost but moves towards 'high' welfare standards become increasingly expensive.

Figure 2 shows the relationship between livestock productivity (and human benefit indirectly) on the horizontal axis and the level of animal welfare on the vertical axis. The point labelled 'A' represents an initial point. As inputs are given to raise the standard of welfare, economic productivity increases as well. This is only true up to point 'B'. From that point, increasing intensity of production is associated with a decreasing standard of animals' perceived welfare. Point 'C' refers to the level of animal welfare that equals the initial standard but is associated with a much higher level of productivity. Point 'D' is the point where the treatment of animals becomes unacceptable by society. If this process is pursued far enough, it is likely that point 'E' will be reached, where the animals are driven to their limits and the system collapses [31]. It would be very favourable if every farmer could calculate where the figure's turning points are located in the case of his own livestock. Unfortunately, this is a conceptual model that originated from general principles that are almost impossible to quantify.

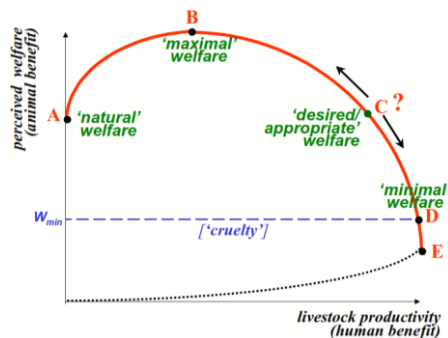


Figure 2

Welfare-productivity (McInerney) model

2.1.2 Aspect of Consumers: Sales Side

Contrary to popular belief, in the developed countries, price is not the primary determinant behind food purchases any more than it is with cars, clothes or any other goods. People seek not the cheapest food items but those with characteristics they want, so they are searching for maximum consumer benefit. There is an exception: when choosing among identical items (eggs, long-life milk, etc.),

consumers will rationally select those with the lowest prices. The quality characteristics associated with food can be real or imagined as well. One of the quality characteristics becoming more and more important to the consumer is the welfare of livestock [24, 31].

Examining the related surveys and statistics about consumers' behaviour, we find a paradoxical situation. On one hand, there is a clear tendency: consumers do care about farm animal welfare in connection with brand reputation. The rise of ethical consumerism over the last two decades has been observed. As global population increases, the limited natural resources are more and more important and valuable [23]. As consumers become more aware of the environmental impacts of their daily lives, hopefully this tendency is the beginning of an ethical consumerism-based society. According to some recent research [40], consumers are concerned with animal welfare, even if they do not necessarily change their eating habits as a result. Seventy-four percent of European citizens think that buying animal welfare-friendly products could have a positive impact on the protection of farm animals. A majority of European Union citizens (55%) state that animal welfare/protection does not receive enough importance in the agricultural policy of their individual countries [18].

Unfortunately, on the other hand, a slight majority of European Union citizens does not take animal welfare into consideration when buying food. (These rates are much worse in the Visegrad 4 (V4) countries; for example, 51% of consumers in Poland never think about the welfare of the animals when purchasing meat. In contrast, nearly two-thirds of Swedes (67%) and Luxembourgers (64%) seem concerned by the conditions under which these animals are reared and consider this when purchasing meat.)

It is also important to add that animal welfare improvements do not increase sales in all cases, but they reduce the chance of a sales loss [26].

Nonetheless, as a result of increased consumer interest, a number of large companies are including animal welfare in their Corporate Social Responsibility (CSR) commitments. Although apparently CSR distracts from the economic role of businesses, it usually helps firms making more long-term profits. Businesses may not be looking at short-run financial returns when developing their CSR strategy [4]. According to a Europe-wide survey [18], the majority of citizens in the V4 countries cannot identify from the label whether the product is sourced from an animal welfare-friendly production system. These identifications are much easier on the other side of Europe, especially in the Germanic and Scandinavian countries. Marketing efforts and CSR are helping attach the label of animal friendliness to certain products or firms, so consumers can distinguish between different products more easily.

It is quite easy to recognise the negative effects of animal welfare regulations on profits because the extra costs speak for themselves. In the long term, it is harder to determine the measurable, quantifiable positive effects of the improved

infrastructure because it is not easy to decide which factor (i.e. more effective medicines, better quality feed, more effective equipment or improved animal welfare) causes the enhanced results. In any case, it can be stated that in the European Union, most of the efficiencies (mortality rate and live births of the livestock, milk production per cow, etc.) have shown progress in recent decades paralleling tighter regulation of animal welfare both at the Community and Member State levels. For example, in Hungary between 2000 and 2010, milk production per cow rose from 5335 litres to 6696 litres, the rate of live-born animals rose from 78% to 84%, and the mortality rate decreased from 5.2% to 4.6% [28]. These changes are not specific to Hungary, as the average cow's milk yield increased by 20% within ten years across the EU-27. This yield was approximately 6 692 kg per dairy cow in 2011 (5 585 kg in 2001); the range extended from more than 8 000 kg per cow in Denmark, Spain, Finland and Sweden to less than 4 000 kg per cow in Romania and Bulgaria [32].

Moreover, experiments focusing on different elements of the connection between animal welfare and productivity show clear correlation related to the investigated phenomenon.

2.2 The Negative Effects of Animal Welfare Measures from the Aspect of Profits

Changes in farm animal welfare standards impact production costs first. Animal welfare regulations mostly require alterations that carry substantial extra costs. Therefore, statutory deadlines for adaptation are often quite long. Even under such conditions, enterprises are usually against the changes, as they believe that the extra production costs incurred due to animal-friendly technologies make employees feel unwanted and inflate the selling price of a product. Farmers would rather focus on immediate productivity instead of non-market externalities such as animal welfare.

The facilities that have failed to comply with the requirements or did not even want to implement them must eventually be closed down. In addition, extra costs may easily cause some enterprises to go bankrupt. It has been an employment policy concern that several enterprises are under-capitalised and will probably go bankrupt, as they cannot provide even the basic funds required for the improvement. This, on the other hand, means a larger market share for competitors that comply with the requirements.

The EU decree of 1999 on egg-laying hens [13] and the Hungarian regulations [34-35] on its implementation are an ample example of this. In the 1990s, the egg-laying hen breeding technologies of that period were often criticised from the aspect of animal welfare. Several proposals and studies had been made on the protection of egg-laying hens, and the European Commission concluded that animal welfare conditions were inadequate with regard to breeding hens in battery

cages and other rearing systems. The regulation stated that its provisions should be applied by facilities that keep more than 350 egg-laying hens and have hens producing eggs for commercial sale. The regulation [13] set out provisions that are more restrictive than the former one regarding the minimum space per animal, the dimension of perches and other technological factors essential for satisfying the physiological-ethological needs of animals. The regulations stipulated that unaltered cages be banned as of 1 January 2012 in the EU, meaning that farmers had 12 years to adjust their systems. Even so, similar to several other EU member countries, in Hungary, not everyone could replace the cages, prompting the EU to adopt an action plan allowing a seven-month transitory period for final compliance. In accordance with this extension, Hungary endeavoured that as of 1 January 2012 through 31 July 2012, traditional cages would be permitted only in facilities that have commenced the transformation procedure but in such cages, a minimum space of 750 square centimetres per hen shall be provided.

The costs of change due to animal welfare regulation may be calculated either in absolute figures or percentages. In the aforementioned example, at a facility formerly with a stock of 10,000 hens, only up to 6,200 animals are permitted to be bred according to the new regulation; this means that either costs per hen rise significantly or space must be increased by 37 percent [33]. These changes must eventually appear in the price of eggs; according to the 2005 Statistical Yearbook of Hungary [28], a minimum price increase of 7.4 percent was observed, and prices were nearing that level at the time when the regulation entered into effect. However, based on the Hungarian Central Statistical Office's flash report, in January 2012 [27], egg prices were up 22.5 percent in comparison to the previous year (it must be noted that prices are also influenced by the overall economic situation).

A study in March 2012 by the European Social and Economic Committee outlined conclusions in light of the assessment of relevant EU policy, revealing that welfare regulations result in higher costs for stockbreeding and animal experiments [33]. The study also concludes that despite all efforts so far, consumer decisions are basically determined by prices, and animal welfare often plays no part or is only one factor among many influencing the product choice. EU animal welfare regulations are difficult to implement, as according to the Commission, they do not enhance producer competitiveness. Stockbreeders are having a tough time anyway, and the extra costs of complying with the regulations exacerbate their woes. Higher costs and the lack of implementation subsidies are aspects of the current policy that undoubtedly deserve to be improved. The document makes it clear that EU animal welfare policy must be more market-oriented. It is crucial that producers recover their extra costs and that consumers be aware of their responsibility and are willing to pay for food produced in line with the European model. In the coming period, the financing of EU animal welfare policy must be boosted by an extent that keeps up with the increasing demands of this policy and meets the claims outlined in the study [16, 33].

2.3 Positive Effect of Animal Welfare Regulations on Individuals and Stocks: Increased Productivity

The key objective of every economic unit, including breeding facilities, is to increase profits. Stockbreeding enterprises are rational economic stakeholders with logical goals. For them, of the numerous options, the most profitable one is the most desirable. Production statistics and costs of a breeding facility are significantly influenced by the animal health indicators of their stocks [8].

Animal healthcare statistics also prove that the large majority of losses of livestock breeding (mortality, compulsory slaughtering, diseases, poor reproduction and body mass index (BMI) results, medical expenses, etc.) are not caused by obligate pathogens. Most losses are the direct result of diseases of animals due to unfavourable conditions related to animal breeding, feeding and raising or other external factors (power failure, damages from hail, etc.). Through the appropriate keeping and adequate care of animals, a sensible animal welfare attitude and practices may prevent material losses from being far larger than expenditures.

Adjustment to the environment requires adaptation energy from animals, which may reduce their performance. The life processes of farm animals are also genetically pre-coded, and technologies should in every case serve the needs of animals by adapting to them. Most breeding technologies, however, cannot ensure conditions that benefit the genetically determined life processes of animals because these must take several other aspects into consideration. Farm animals are capable of tolerating modified conditions up to a certain point, but technological development may reach a level with which animals are unable to cope [7]. The animal's general wellbeing would be affected, and it may become anxious and even feel pain.

Generally speaking, performance is an indicator of contentment. Stress adversely affects the processing of fodder, production of milk and eggs, weight gain and reproductive indicators as well; consequently, its impact on farm animals is negative. Only animals that are content are capable of reproduction and delivering excellent production figures. (It may happen, as a rare exception, that top performing animals are deprived of basic living conditions, as in the case of battery cage systems for egg-laying hens. Although the conditions for an animal to produce 300+ eggs per year are in place, its wellbeing is quite questionable [7]).

Diseases may hamper the production of an animal stock by draining production resources and/or limiting production output (direct effects). The term 'disease' refers to aggregate harmful processes resulting from the disruption of homeostasis, which may either have overt (i.e., death) or covert effects (e.g., reduced milk production). Harmful processes may cause the following calculable losses from production:

- Weaker reproduction figures are one of the most significant loss factors;
- Death;
- Deterioration of quantity or quality of animal produce; and
- Losses due to lower capacity utilisation [8].

The animals' diseases may also affect other elements of the economic system (indirect effects). Examples of this phenomenon are slower growth of the agricultural sector and export restrictions [8].

Accordingly, the following stock indicators are applicable for assessing the performance of a stockbreeding facility:

- Death rate at the facility;
- Frequency of certain diseases or the subsequent death rate;
- Maturation rate;
- Reproduction indicators; and
- Life expectancy [39].

Consequently, regarding the planning of a breeding technology, aspects that may sometimes appear irrelevant or costly also must be taken into account because they eventually contribute to efficient production. Although there is no European Council directive about dairy cows especially, there are protocols relevant in the non-regulated questions. The Welfare Quality Assessment Protocol for Cattle [41] shows standardised ways to develop animal welfare in the case of dairy cattle. Ease of movement is one of the three welfare criteria of the good housing of the animals; they should have enough space to be able to move around freely. In the "Expression of other behaviours" part of the same Protocol, the hours spent at pasture are taken into consideration; the more hours the animal spends at pasture, the higher animal welfare score the farm reaches. In accordance with these criteria, there are several experiments that underline the advantages of open yard housing for cattle: better reproduction index [5], significantly less udder infection and less mastitis disease, and fewer animals falling out of production [22]. Open yard housing not only contributes significantly to the welfare of cattle but also provides conditions favourable to extending the useful lifetime of animals. Furthermore, we are back to the profit-oriented point of view as well. The long useful lifetime of animals is one of the key components of economical production [36].

The successful welfare-based livestock farm should meet four criteria of economic success: it should maintain or improve levels of health, improve the economics of the production system, be practical to employ, be sustainable, but not least, it should increase species-specific behaviour [38].

The measures and changes taken to fulfil the animal welfare requirements are often accompanied by technological improvements and modernisation, which can optionally keep a husbandry company competitive. In Hungary, the production of turkey meat has begun to decrease drastically since 2010. While purchase prices have risen slightly, they have not been able to offset the growth of energy and feed prices. The majority of the market participants have therefore suffered a loss in 2012, except those who had already modernised their ventilation, feeding and water supply systems [3].

These indicators shed light on certain aspects of wellbeing; therefore, multiple assessments and their evaluation can help determine the wellbeing of an individual animal. However, associations identified at the animal level and in the experimental setting might not appear at the farm level and in common practice; therefore, De Vries et al. [17] investigated the associations between variables of routine dairy herd data and the welfare indicators used in the Welfare Quality Assessment Protocol for Cattle to estimate the levels of animal welfare in dairy farms. Their conclusion was that cross-sectional studies using integrated welfare scores at the farm level are needed to more accurately determine the potential for variables of routine herd data to estimate animal welfare on dairy farms.

Conclusions

The economic effects of animal welfare regulations on a company could be examined basically from two points of view: from the aspect of productivity changes or from the aspect of the consumers — the sales' side.

In most cases, the rates of productivity are improving, especially in the long run. Species that are allowed to live according to their nature are healthier, live longer and produce more — a win-win situation for the owner, the animal and society.

From the sales' side, there are difficulties that must be overcome. Public interest towards animal welfare is rising but – because of financial reasons or the lack of information – in most cases, consumers do not buy more animal-friendly products, especially because they are more expensive.

Animal welfare regulations are slowly but surely re-organising livestock production and therefore, the food market itself. In the long term, only some of the market participants are able to remain competitive, whereas the others fall out of the market. However, hopefully the satisfaction of consumers and the remaining companies will rise along with the animals' better living conditions.

Although natural ecosystems and modern-day, large-scale market systems are likely not able to coexist in the long term, partial improvements are possible by developing market methods. Experts of environmental economics are of the opinion that progress can be made by raising public awareness of the problems Nature is facing [29]. Paying attention to animal welfare, including creating more restrictive animal welfare regulations, belongs to this stream of thought.

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