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Review

THE THREE PILLARS OF APPLIED FARM ANIMAL WELFARE

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Abstract

There is an evident difference in the implementation level of animal welfare (AW) across the societies and countries worldwide. Although multiple factors contribute to these differences, we can summarize them into a three pillar concept, the three aspects of applied farm AW. The objective of this review is to analyse applied AW on farms from the ethical, economic and animal health aspects. Modern ethics emphasizes biocentrism against anthropocentrism, the modern ethical concept of bioethics. Additionally, beside the differences among the major ethical concepts, there is a consensus that AW deserves a respectful place. An animal's economic value is not only limited by its material value determined by the inputs and outputs. Thus, rather than being simply considered as a "stock-good" machine, animals are valued as a sentient beings with "added value", which has an impact on the final product price. Animal health and welfare are interconnected and are based on the impact of AW on health and vice versa. The implementation of higher welfare standards to farm animals is only possible if AW is accepted as part of the health of the animal. The applicability of this concept is presented through the European Union AW legislation, which is based on public opinion, economy and animal health. As a conclusion, applied AW is possible only at the level at which the three pillars are equally balanced, and the initiatives in this field should work and be focused on ethics, economics and health.

Key Words: animal health, animal welfare, economy, ethics, higher standards, implementation

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INTRODUCTION

After more than 50 years of diligent work (if we consider the Brambell report as a starting point; Brambell, 1965), animal welfare (AW) as a discipline has developed clear and objective scientific methods, has produced reliable results and has contributed to clearer knowledge on the animal body's functional mechanisms. Today's understanding of AW is related to stress, distress, pain, health, mental and emotional state and naturalness of the animal (Hewson, 2003). These factors can also be found in various definitions for AW, starting from the definition by Broom (1986) "the welfare of an animal is its state as regards its attempts to cope with its environment" (Broom, 1986) through to AW's conception of basic health and functioning, natural living and affective states (Fraser, 2008). These developments and understandings of AW are not solely recognized and acknowledged by the scientific community. The wider public is manifesting a progressive trend of increasing knowledge about AW and of understanding animals' welfare needs. Even further, the public is having a high impact on AW research and on developing the corresponding standards. The involvement of the wider public is especially important in assessing and improving AW. Thus, Fraser concluded that "the science that we do to assess and improve AW is influenced by value-based ideas about what is important or desirable for animals to have a good life" (Fraser, 2008). This dual, science- and values-based approach has strongly determined the practical implementation of AW and its standards.

Besides comprehensive knowledge on AW and some extent of awareness about AW, there are evident differences in its implementation among different societies and countries. Consequently, there is a clear discrepancy between the implementation of AW standards and legislations across European Union member states (Miele et al., 2015). Likewise, globally, these differences, i.e. "disputes", in applied AW can be recognized in international organizations, such as the World Trade Organization (Kahn, 2020). In this context, worldwide differences between AW implementation and relevant legislation between countries, regions and continents are more than evident (Bracke, 2009). For example, there are wide discrepancies between the European countries in the AW assessment scores for different welfare categories and principles in dairy cows (de Graaf et al., 2018). Here is one specific example from the farm AW assessments: while the 75th percentiles of very lean cows and dirty udder in dairy farms in France were 23.1% and 35.4%, respectively (des Roches et al., 2014), in Macedonia these percentiles were 54.7% and 84.6% (Radeski et al., 2015).

Still, there are other trends and initiatives where applied AW is becoming part of more holistic approaches where its implementation affects wider processes. That is the case with the integration of applied AW in the One Health concept, where a reciprocal relationship is present between One Health and AW initiatives (Radeski et al., 2018). The reasons for these great variations in the implementation of AW are multifactorial and vary from case to case. Nonetheless, if we summarize the main drivers for implementing improved AW, three major aspects are pointing out: ethical,

economic and animal health. Hence, the objective of this review is to overview and to analyse applied AW from the ethical, economic and animal health aspects, and the implications of these three factors in higher AW standards.

THE THREE PILLAR CONCEPT

The integration of the AW concept in farm management, as previously mentioned, depends of the three key aspects: ethical, economic and animal health. There are other aspects or factors that might be the determinants of applied AW, such as educational, social, religious, cultural etc. However, they could also be seen as part of the three major ones. This approach does not minimize the importance of any other factors but rather integrates them into a concept that is globally applicable in different societies, cultures, countries or in any other defined system. The three key aspects are the main pillars in applied AW (Figure 1). Thus, the importance of each of the three pillars is equally relevant. If the pillars are not balanced, then the implementation of AW will be at the level of the weakest pillar. This might also be relevant for the improvement of farm AW, where higher standards would occur only if the three interconnected pillars are at the same level of development. The following text in this review presents the three aspects of applied AW and the three pillar concept of applied AW.

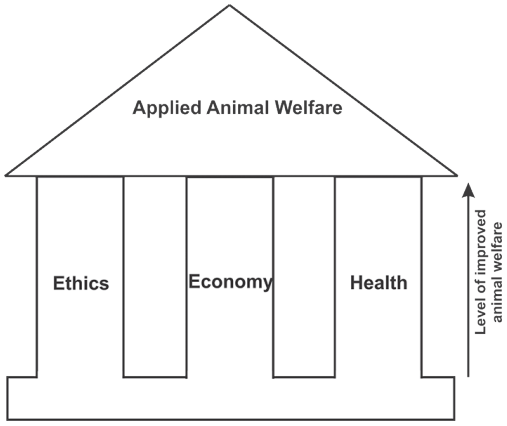

Figure 1. The concept of the three pillars of applied animal welfare. The balanced level of the pillars (ethics, economics and health) determines the level of improved animal welfare (arrow on the right).

ETHICAL ASPECT

Ethics deals with moral issues by which an individual or a group sets behavioural criteria (Hobson, 2004; Broom, 2006b). One of the many moral issues is the relationship between humans and animals. Modern societies, valuing empathy and altruism, frequently deal with this topic. Therefore, modern ethics emphasizes biocentrism against anthropocentrism, shaping itself into the modern ethical concept of bioethics.

Bioethical standards and the public desire for an animal's good quality of life are highly dependent on knowledge and understanding of the concept of "what is good" for the animal. This is frequently controversial, non-unified knowledge and a subject of continuous debate, even in professional circles. However, the pursuit by the public of understating animals' needs with the aim of providing quality of life is evident and continuous. Fraser et al. (1997) acknowledged that the science of AW exists because of society's ethical concerns rather than the curiosity of scientific pioneers in the field. This distinguishes AW science from other scientific fields.

AW can be presented as a connecting concept between scientific research and its ethical implications. Bioethical standards at both intra-species and inter-species levels are proportional to the scientific knowledge and understanding of the animal needs. The animal's "quality of life" is a key aspect of society's ethical concerns for AW. Fraser et al. (1997) distinguished three types of ethical concerns related to an animal's quality of life: 1) animals should lead a natural life through the development and use of their natural adaptations and capabilities (naturalness); 2) life is based on experiencing normal pleasures i.e. positive emotional states (comfort, satisfaction, etc.) and reducing negative states (pain, starvation, fear, etc.) and; 3) well-functioning of the animal is achieved by reaching normal, satisfactory health and growth and optimal functioning of physiological and behavioural systems. These concerns initiated development of four mid-level principles: "(1) to provide good lives for the animals in our care, (2) to treat suffering with compassion, (3) to be mindful of unseen harm, and (4) to protect the life-sustaining processes and balances of nature" (Fraser, 2012). All these ethical aspects are drivers in the scientific research on AW and in the societal values that might be incorporated in national and international legislation. These drivers are the major force in achieving high standards in bioethics and in improving animal treatment.

Quality of life in animals is an inseparable concept in different branches of ethics. Thus, one of the founders of utilitarianism, John Stuart Mill, wrote that the human must comply with its rules so it can achieve a higher quality of life both for himself and for all other living beings able to feel (Mill, 1863). Deontology, which defines a set of rules according to which certain actions are suggested to be good or bad (Brook, 2007), also considers the concept of an animal's quality of life, incorporating the veterinary profession among others. Consequentialism defines the consequences of undertaken actions (Kagan, 1998), including those on the quality of life of animals. These three ethical views (utilitarianism, deontology and consequentialism) position the AW concept in a respectable place, regardless of any disagreements in these views and the dilemmas regarding the most suitable approach in applying AW. Dilemmas are, for example, individual versus collective AW, and longer or shorter lives of farm animals with their attendant consequences. However, there is a consensus that increased research in AW has fulfilled the aim of many authors to "biologize" the ethics (Meehan, 1975; Broom, 2006b). In brief, the development of ethics and the rich debate for some ethical concerns related to animals confirms the importance of the ethical aspect of AW in the social, philosophical and scientific sense.

ECONOMIC ASPECT

McInerney (2004) best describes the economic aspect of AW by the conflicted relationship between AW and animal productivity (this is the direct benefit to human). McInerney's curve shows that animal productivity and welfare are positively correlated up to a certain maximum level which is then followed by a decrease at the expense of the welfare. This shows that forced productivity can have a highly negative impact on AW and can be considered as exploitation. Therefore, this conflict between high productivity and AW ends with a point of balance. Where this point of balance is greatly depends on societal values and market demands. Of course, the ideal balance would be that neither AW nor financial plausibility are neglected.

In the money flow cycle, the factor market (factors of production) and the product market (final products) both operate, while the state is also influential. AW is part of this cycle by its societal value. In the economy, everything that has a societal value also has an economic value, which is defined by the members of the society. This economic value is usually expressed by the consumer's willingness to pay for something. Therefore, if AW is highly valued by society, then it can be considered as an economic value as well. The higher the demands of society for a certain valued good (in this case, AW), the higher the price will be on the market (McInerney, 2004; Fearing and Matheny, 2007). Therefore, the animal's value is not only limited by its material value determined by the inputs and outputs, but also by its "no-use" value, i.e. "existence value", which is defined and set by society.

The market always reacts according to changes in supply and demand. Producers continuously attempt to market what consumers demand at an appropriate price, taking into consideration how highly the product is valued by consumers (Fearing and Matheny, 2007). The economic rationale of applied farm AW is exactly in this context. The demand of consumers to buy animal products produced with consideration for their welfare has forced producers to implement and upgrade their AW standards (Eurobarometer, 2005; Vetter et al., 2014). International competition has additionally increased these standards, which have surpassed the minimum national legislation demands. However, AW standards must not be fully dependent just on market mechanisms, which can be influenced by external factors, opportunity costs and/or high competition. If that were the case, AW could be negatively affected. This is where the state and legislation need to serve as a protective mechanism from negative market influences on applied AW as a public good and social benefit (Fearing and Matheny, 2007).

At a certain point, high AW standards inevitably need to be reflected in product prices. Although this seems counterintuitive in terms of improved farm AW, the actual increased final product prices are very benign. Taking into consideration that the producers' expenses account for just one-quarter of the final price, the price alterations due to the implementation of AW standards will affect only this portion of the value (McInerney, 2004). Furthermore, the rule that also applies here is: the longer

the production chain, the lower the impact on the product's final price. This means that the implementing higher AW standards in the integrated production will have low relative effect on the final price of the product. Indeed, in low socio-economic holdings, small changes in the price might not be positively perceived and could influence consumers' ability to purchase animal products (Fearing and Matheny, 2007). Hence, higher AW standards are likely determined and guided by households that are at least in the middle-income range.

The economy has a major role in the implementation of AW. Minor economic decisions could result in significant shifts in AW standards. That is why farm management must be very careful in implementing economic-driven decisions. The high expenses for implementing AW standards are always neutralized by consumers' willingness to pay higher prices for the product. Nevertheless, this balance is highly dependent on society's values. The moral and ethical aspects of AW in modern societies have given an added economic value to the animals. Therefore, rather than being simply considered as a "stock-good" machine, animals are now valued as sentient beings with "added value" – value that is becoming more widely accepted by modern farmers and producers.

HEALTH ASPECT

The health aspect of AW should be analysed from two perspectives: 1) the impact of AW on animal health, and; 2) the impact of the health of the animal on its welfare (Broom and Corke, 2002; Broom and Fraser, 2007). Poor AW is correlated to immunosuppression and a higher than normal disposition to diseases (Broom and Kirkden, 2004). Conversely, animals that are in a good welfare state are much more resilient to pathogens and diseases than animals subjected to poor welfare conditions (Broom, 2006a). The link between AW and disease can be demonstrated by: clinical manifestation in relatively few animals in the herd (most commonly the "weak" members of the herd); experimental studies or studies on the incidence of disease occurrence in different breeding systems and/or types of treatments and; immune system status following various types of treatment of the animal (Broom and Fraser, 2007). The pathogens, as part of the environment, elicit an animal's immune response in order to cope with them (Broom and Corke, 2002; Broom and Fraser, 2007). The described response is very similar to the well-known definition of AW. The pathogens initiate a set of immunological responses including complement activation, and proliferation of antibodies, granulocytes, macrophages, T-cells, natural killer (NK) cells and memory cells. In the case of low AW, glucocorticoid levels (cortisone, corticosterone) are raised as a normal stress response (Broom and Johnson, 1993) which leads to more immunosuppression (Coutinho and Chapman, 2011) and greater susceptibility to diseases. This effect of the glucocorticoids is manifested by direct interaction with transcriptive or post-transcriptive mechanisms affecting the production and/or function of anti-inflammatory proteins (Cruz-Topete and Cidlowski, 2014). The

immune response is also affected by β-endorphin, vasopressin and oxytocin, which normally have a stimulating effect (Broom and Fraser, 2007).

The connection between the nervous and immune systems has been demonstrated by the decreased cellular immune response following hypothalamic and reticular formation lesions, and by the decreased humoral response following *locus coeruleus* lesions (Song and Leonard, 2000). The interactions between the environment, brain, behaviour and the immune system are studied by a separate scientific discipline, called psychoneuroimmunology, which was introduced at the beginning of the 20th century in the scientific community. The intricate interaction between the immune and nervous systems suggests that the immune response is "at least partially affected by psychological processes" (Zachariae, 2009). Psychoneuroimmunology confirms the effect of AW on animal health.

Intensive farm animal production and its corresponding breeding systems were the reasons for the occurrence of so-called "production diseases", which are manifested due to decreased AW and overload of an animal's physiological capacities. This is evident by the frequent occurrence of metabolic disorders (Pryce et al., 1997), footrot, mastitis and reproductive problems in high-producing dairy cows. In broilers, the high body mass yield causes cardiovascular disorders, ascites, deformed feet and inability to stand with consequent dermatitis on the chest skin due to frequent lying (Broom and Fraser, 2007). In these and many other examples, animal health is demonstrably directly affected by environmental conditions, i.e., production pressure, excluding the immunosuppression in the chain of disease occurrence.

The inability of a diseased animal to cope with its environmental conditions relates directly to the principle of the animal being free of pain, injury or disease; this reflects the second perspective of health, i.e., the impact of health of the animal on its welfare. Thus, the previous example of dermatitis in broilers as a result of continued skin contact (foot, hock, chest and cloacal regions) with ammonia-rich bedding illustrates how the inability to freely move induces the lack of coping, with consequent impact on AW (Broom and Corke, 2002). The same applies to the examples of dairy cows with mastitis, metabolic disorders or lameness. The reasons for lameness can be environmental or due to the metabolic pressure of the individual (Broom and Corke, 2002). Lameness in dairy cows causes pain and changes behaviour, which substantially decreases the welfare of the animal, irrespective of its clinical or subclinical manifestation (Galindo and Broom, 2002; Bruijnis et al., 2011). These examples briefly present the effect of animal health on AW. The veterinarian practitioners have a major role in this area. They can improve the welfare of the diseased animals with proper medical treatment, independent of the animals' future use.

Animal health as an essential component of AW is incorporated in the activities and policies of the World Organization for Animal Health – OIE (OIE, 2015). Since its founding in 1924, OIE's main goal has been to establish international animal health standards. AW appeared for the first time in OIE's strategic plan of 2001-2005. The

first Animal Welfare Working Group was formed in May 2002 at the 70th General Assembly. The following year, OIE accepted the working group's recommendations. The AW principles for terrestrial species were defined at the first global AW conference held in 2004 by OIE (OIE, 2005). The member countries started adopting the science-based standards for terrestrial and aquatic animals in their national legislations in 2005 (OIE, 2016a), and these are continuously updated following recent scientific findings. In the terrestrial (OIE, 2016b) and aquatic (OIE, 2016c) animal health codes, AW standards and recommendations are elaborated in Chapter 7. Article 7.1.1 states "Good animal welfare requires disease prevention and veterinary treatment, appropriate shelter, management, nutrition, humane handling, and humane slaughter/killing" (OIE, 2016b). Article 7.1.2 defines the main AW concepts, firstly stating that "There is a critical relationship between animal health and animal welfare" (OIE, 2016b). This indicates the significance of animal health on AW. Considering all these perspectives regarding the health aspect, a dilemma has arisen among scientists in the past decade as to whether animal health and AW should be treated separately or as the same thing (Husu-Kallio, 2008). Naturally, as soon as AW is accepted as part of the health of the animal, the implementation of higher welfare standards for farm animals will become reality.

ANIMAL WELFARE LEGISLTATION (EU EXAMPLE) – OUTPUT OF THE THREE PILLARS

The Brambell Report in 1965 (Brambell, 1965) indirectly contributed to establishing and defining the concept of AW and later to its incorporation in European legislative procedures. International institutions such as the European Union are very important in unifying legislation and defining requirements to be adopted by its member states, guaranteeing compliance with at least the minimum AW standards.

The Council of Europe, founded in 1949, was the first international organization that initiated actions for good AW (Veissier et al., 2008). Currently, the Council of Europe has 47 member states which are represented in the Council of Ministers and the European Parliament. This organization started working in the early 1960s to adopt the concept that consideration and respect for animals is a mutual heritage of the European nations and is closely related to human dignity (Veissier et al., 2008). The Council of Europe set the track in AW standards for today's EU legislation. Thus, this Council adopted five European Conventions that define and control the use of animals by humans. Three of the European Conventions include farm animals, and their scope is farming, international transport and slaughter. The other two conventions include experimental animals and pets. These conventions incorporated the latest scientific knowledge at that time on the innate characteristics and needs of animal species. Therefore, they define the minimum standards for food, health, space for movement, physical comfort, social interactions, normal behaviour, and protection against physical

and psychological stressors. These conventions emphasize the importance of training people who are in direct contact with animals (Veissier et al., 2008).

The European Commission (EC), as the executive branch of EU, has promoted AW since the 1970s. By adopting directive 78/923-EEC, the EC aimed to establish equal competence on the single market among the member states which had different levels of animal protection legislation. Directive 98/58/EC, adopted in 1998, regulates the protection of farm animals used for food, wool, leather and other goods. Animals were recognized as sentient beings by the EU, first in the Amsterdam Treaty in 1997 (European Communities, 1997), and later in the Lisbon Treaty in 2009 - Treaty on the European Union and the Treaty on the functioning of the European Union, Article 13 (European Union, 2009).

EU member states must comply with the minimum standards for animal protection and AW requested by the EC, but they can also implement higher national standards if necessary (European Commision, 2016). The Directorate-General for Health and Food Safety (DG-SANTE), the EC department responsible for EU policy on food safety, safety of other products and public health, also proposes new legislation to the EC related to animal protection and AW. DG-SANTE collaborates with working groups that provide scientific opinions for specific issues. One of the main working groups for AW is the Panel on Animal Health and Welfare, which is a part of the European Food Safety Authority (EFSA). They have published numerous scientific opinions on AW for different animal species and applied methods for pigs, calves, broilers, laying hens, cattle, sheep, cloning methods and others (European Commision, 2016). Following this, the EC adopted Directive 98/58-EC (European Council, 1998), which defines the minimum standards for farm animal protection, and additional directives for individual animal protection.

The EC encourages the legislation by promoting strategies for AW. The EU Animal Health Strategy 2007-2013 was promoted by the motto "prevention is better than cure" (European Commission, 2007; Husu-Kallio, 2008). This strategy focused on preventive measures, disease surveillance, controls and research. It also promoted on-farm biosecurity measures and AW which would prevent health threats to animals and would minimize the environmental effects (European, 2014). The EU's Strategy for the Protection and Welfare of Animals 2012-2015 was even more significant for improving AW standards and their implementation in EU member states. By promoting the concept "All are responsible" the aim was to increase AW awareness to farmers, veterinarians, consumers-customers, and relevant organizations, agencies and individuals (European Commission,, 2012). By implementing this strategy, the EU achieved unification in the minimum standards and legislation in its member states. On 26 November 2015 and later on 21 July 2016, the European Parliament adopted a resolution that requested the EC to implement and evaluate the key points of the strategy. Additionally, the EC was instructed to prepare a new strategy for 2016-2020 which would continue to improve AW standards in the EU (Rojek-Podgórska, 2016). The role of the EU in implementing and increasing AW and animal protection

standards is important for its member states but also for other countries outside the EU. Additionally, the EU AW legislation is a great example of the three pillar concept presented in this review since it is based on public opinion, economics and animal health.

CONCLUSION

This review presents the three pillar concept of applied AW, comprised of ethical, economic and animal health aspects. The ethical aspect is crucial for applied AW since societal values can solely determine at which level AW will be implemented. Considering this, the economy then adapts to the needs of consumers and AW becomes a relevant segment in determining the final price of the animal products. Additionally, taking care of the health of the animal also means higher AW. According to the presented concept, the implementation of improved AW in any society is possible only at the level at which the three pillars (ethics, economics and health) are equally balanced. Furthermore, this implies that applied AW is possible if the welfare initiatives are working and are focusing on ethics, economics and health.

Authors' contributions

MKj developed the three pillar concept for applied animal welfare, MKj and MN wrote the manuscript, KI, LP and VI participated in the design process, reviewed and challenged the concept.

All authors read and approved the final manuscript.

Competing interests

The authors hereby declare that they have no competing interests.

REFERENCES

Bracke M. B. M. 2009. Animal welfare in a global perspective. In *Rapport/Wageningen UR Livestock Research, No. 240,* Lelystad: Wageningen UR Livestock Research.

Brambell F. W. R., Technical Committee to Enquire into the Welfare of Animals kept under Intensive Livestock Husbandry Systems. 1965. In *Report of the Technical Committee. Animals Kept Under Intensive Livestock Husbandry Systems*, London: HM Stationery Office.

Brook R. 2007. Deontology, paradox, and moral evil. Social Theory and Practice, 33(3)**:**431-440. https://doi.org/10.5840/soctheorpract200733316

Broom D. M. 1986. Indicators of poor welfare. British Veterinary Journal, 142(6):524-526.

Broom D. M. and Johnson, K. G. 1993. Stress and Animal Welfare. Dordrecht: Springer.

Broom D. M. and Corke M. J. 2002. Effects of disease on farm animal welfare. Acta Veterinaria Brno, 71(1)**:** 133. https://doi.org/10.2754/avb200271010133.

Broom D. M., Kirkden R. D. 2004. Welfare, stress, behaviour and pathophysiology. In Veterinary Pathophysiology. Eds. R. H. Dunlop and C. H. Malbert. Blackwell, Ames, Iowa, pp. 337-369.

Broom D. 2006a. Behaviour and welfare in relation to pathology. Applied Animal Behaviour Science, 97(1)**:** 73-83. https://doi.org/10.1016/j.applanim.2005.11.019

Broom D. 2006b. The evolution of morality. Applied Animal Behaviour Science, 100(1-2)**:**20-28. https://doi.org/10.1016/j.applanim.2006.04.008

Broom D. M., Fraser A. F. 2007. In *Domestic Animal Behaviour and Welfare*. CABI.

Bruijnis M. R. N., Beerda B., Hogeveen H., Stassen E. N. 2011. Assessing the welfare impact of foot disorders in dairy cattle by a modeling approach. Animal 6(06)**:**962-970. https://doi.org/10.1017/S1751731111002606.

Coutinho A. E., Chapman, K. E. 2011. The anti-inflammatory and immunosuppressive effects of glucocorticoids, recent developments and mechanistic insights. Molecular and Cellular Endocrinology, 335(1)**:**2-13. https://doi.org/10.1016/j.mce.2010.04.005.

Cruz-Topete D., Cidlowski J. A. 2014. One Hormone, Two Actions: Anti- and Pro-Inflammatory Effects of Glucocorticoids. Neuroimmunomodulation, 22(1-2)**:**20-32. https://doi.org/10.1159/000362724.

de Graaf S., Ampe B., Buijs S., Andreasen S., des Roches, A. D. B., Haskell M. J., Kirchner M., Mounier L., Radeski M., Winckler C., Bijttebier, J. 2018. Sensitivity of the integrated welfare quality® scores to changing values of individual dairy cattle welfare measures. Animal Welfare, 27**:**157-166. https://doi.org/10.7120/09627286.27.2.157.

des Roches A., Veissier I., Coignard M., Bareille N., Guatteo R., Capdeville J., Gilot-Fromont E., Mounier L. 2014. The major welfare problems of dairy cows in French commercial farms: an epidemiological approach. Animal Welfare, 23(4)**:**467-478. https://doi.org/10.7120/09627286.23.4.467.

European Communities. 1997. In Treaty of Amsterdam amending the treaty on European Union, the treaties establishing the European Communities and certain related acts. Luxembourg: Office for Official Publications of the European Communities.

European Commission. 1998. Concerning the protection of animals kept for farming purposes. Council Directive 98/58/EC. Official Journal L, 221(08), 08.

European Commission. 2005. Attitudes of consumers towards the welfare of farmed animals. Special Eurobarometer, 229:45-46.

European Commission: Animal welfare. Available at http://ec.europa.eu/food/animals/welfare_en. Accessed 15.5.2021.

European Commission. 2007. In Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions, A new Animal Health Strategy for the European Union (2007–2013) where "Prevention is better than cure". Brussels: European Commission.

European Commission. 2012. In Communication from the commission to the european parliament, the council and the european economic and social committee on the European Union Strategy for the Protection and Welfare of Animals 2012-2015. Brussels: European Commission.

European Commission. 2014. Discussion paper on Progress under the Animal Health Strategy for the European Union (2007-2013) where "Prevention is better than cure" and possible future steps. Brussels: European Commission.

European Union. 2009. Treaty of Lisbon amending the Treaty on European Union and the Treaty establishing the European Community, OJ C 306: 1–271

Fearing J., Matheny G. 2007. The state of the animals 2007. In The role of economics in achieving welfare gains for animals. Eds. D. J. Salem, A. N. Rowan. Humane Society Press, Washington DC, pp. 159-173.

Fraser D., Weary D. M., Pajor E. A., Milligan B. N. 1997. A scientific conception of animal welfare that reflects ethical concerns. Animal welfare, 6: 187-205.

Fraser D. 2008. The role of the veterinarian in animal welfare. Animal welfare: too much or too little? In 21st Symposium of the Nordic Committee for Veterinary Scientific Cooperation (NKVet). Acta veterinaria Scandinavica, 50, Suppl 1**:** S1. https://doi.org/10.1186/1751-0147-50-s1-s1.

Fraser D. 2012. A "Practical" Ethic for Animals. Journal of Agricultural and Environmental Ethics, 25(5)**:**721-746. https://doi.org/10.1007/s10806-011-9353-z.

Galindo F., Broom D. M. 2002. Effects of lameness of dairy cows. Journal of Applied Animal Welfare Science, 5(3)**:**193-201. https://doi.org/10.1207/s15327604jaws0503_03.

Hewson C. J. 2003. What is animal welfare? Common definitions and their practical consequences. The Canadian veterinary journal, 44(6)**:**496-499.

Hobson A. 2004. The Oxford Dictionary of Difficult Words. Oxford: Oxford University Press.

Husu-Kallio J. 2008. Animal health and animal welfare – is it the same thing? Acta Veterinaria Scandinavica, 50(1):1-3. https://doi.org/10.1186/1751-0147-50-S1-S2.

Kagan S. 1998. Normative Ethics. Routledge: Westview Press.

Kahn S. 2020. Animal welfare in the context of World Trade Organization dispute settlement. Revue scientifique et technique (International Office of Epizootics), 39(1)**:**69-79. https://doi.org/10.20506/rst.39.1.3063.

McInerney J. 2004. Animal Welfare, Economics and Policy. Report on a Study Undertaken for the Farm & Animal Health Economics Division of Defra. Exter, UK.

Meehan M. C. 1975. Sociobiology: The New Synthesis. Harvard University Press . https://doi.org/10.1001/jama.1975.03260090072033.

Miele M., Bock B., Horlings L. 2015. Animal welfare: The challenges of implementing a common legislation in Europe. In Handbook of the international political economy of agriculture and food. Eds. A. Bonanno, L. Busch. Edward Elgar Publishing, pp. 295-321.

Mill J. S. 1863. Utilitarianism. London: Parker, Son, and Bourn.

OIE. 2005. Terrestrial Animal Health Code, (14th edition). Paris, OIE.

OIE (2016a): Animal welfare at a glance. Available at: http://www.oie.int/en/animal-welfare/animal-welfare-at-a-glance/. Accessed 07.10.2016.

OIE (2016b). Chapter 7, Animal Welfare. In *Terrestrial Animal Health Code* (25th edition), Paris: OIE.

OIE (2016c). Chapter 7, Animal Welfare. In *Aquatic Animal Health Code* (19th edition), Paris: OIE.

Pryce J. E., Veerkamp R. F., Thompson R., Hill W. G., Simm G. 1997. Genetic aspects of common health disorders and measures of fertility in Holstein Friesian dairy cattle. Animal Science, 65(3)**:**353-360. https://doi.org/10.1017/S1357729800008559.

Radeski M., Janevski A., Ilieski V. 2015. Screening of selected indicators of dairy cattle welfare in Macedonia. Macedonian Veterinary Review, 38(1)**:**43-51. https://doi.org/10.14432/j.macvetrev.2014.11.031.

Radeski M., O'Shea H., De Meneghi D., Ilieski V. 2018. Positioning animal welfare in the one health concept through evaluation of an animal welfare center in Skopje, Macedonia. Frontiers in Veterinary Science, 4, 238. https://doi.org/ 10.3389/fvets.2017.00238.

Rojek-Podgórska B. 2016. EU animal welfare strategy, 2012-2015, State of play and possible next steps. European Parliamentary Research Service.

Song C., Leonard B. E. 2000. Fundamentals of Psychoneuroimmunology. John Wiley and Sons.

Veissier I., Butterworth A., Bock B., Roe, E. 2008. European approaches to ensure good animal welfare. Applied Animal Behaviour Science, 113(4):279-297. https://doi.org/10.1016/j.applanim.2008.01.008.

Vetter S., Vasa L., Ózsvári L. 2014. Economic aspects of animal welfare. Acta Polytechnica Hungarica. 11(7):119-134.

Zachariae R. 2009. Psychoneuroimmunology: A bio-psycho-social approach to health and disease. Scandinavian Journal of Psychology, 50(6)**:**645-651. https://doi.org/10.1111/j.1467-9450.2009.00779.x.

TRI STUBA PRIMENJENE DOBROBITI FARMSKIH ŽIVOTINJA

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Kratak sadržaj

Postoji evidentna razlika u nivou primene dobrobiti životinja u društvima i zemljama širom sveta. Iako ovim razlikama doprinosi više faktora, mi ih svodimo na koncept "tri stuba", tri aspekta primene uslova dobrobiti farmskih životinja. Cilj ovog prikaza je analiza primene uslova dobrobiti farmskih životinja sa etičkog, ekonomskog i aspekta zdravlja životinja. Moderna etika ističe biocentrizam protiv antropocentrizma, moderne etičke koncepte bioetike. Osim toga, pored razlika među značajnim etičkim konceptima, postoji konsenzus da dobrobit farmskih životinja zaslužuje posebno mesto. Ekonomska vrednost životinja nije definisana samo materijalnom vrednošću određenom finansijskim ulazima i izlazima. Dakle, umesto da se smatraju proizvodom, životinje se vrednuju kao živa bića, što ima uticaja na konačnu cenu. Zdravlje i dobrobit životinja su međusobno povezani i zasnivaju se na uticaju dobrobiti životinja na njihovo zdravlje i obrnuto. Implementacija dobrobiti kod farmskih životinja je moguća samo ako se dobrobit prihvati kao deo zdravlja životinje. Primenjivost ovog koncepta je predstavljena kroz zakonodavstvo EU o dobrobiti životinja koje se zasniva na javnom mnjenju, ekonomiji i zdravlju životinja. Kao zaključak, primena dobrobiti je moguća samo na nivou na kojem su sva tri stuba dobrobiti podjednako izbalansirana, a inicijative u ovoj oblasti bi trebalo da deluju i da se fokusiraju na etiku, ekonomiku i zdravlje.

Ključne reči: zdravlje životinja, dobrobit životinja, ekonomija, etika, viši standardi, implementacija