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# NUTRITIONAL LEVEL AND QUALITY – CONDITION AND COMPONENT OF ANIMAL WELFARE

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**Abstract**

***This paperwork highlights the role that plays the animal nutrition, in terms of level and quality, in relation to interdependence with other animal welfare criteria. It is necessary to apply nutritional strategies, taking into account the optimization of feeding conditions and nutritional intakes, in order to meet the objectives of animal welfare, which must take into account both health and environmental conditions, their maintenance and their service. In this way, the administration of food and the provision of all the necessary nutrients, depending on the species, the category of production, the physiological state must be applied in such a way that each animal has the freedom to express its normal behavior under conditions of well-being.***

Keywords**:** nutrition, welfare, feed, animals

## 1. INTRODUCTION

This direct relation between the feeding of animals of economic interest and the fulfillment of the condition of their welfare involves different aspects, both in terms of physiological requirements and the expression of their productive potential. Nutrition levels and quality reflect one of the recommendations that are intended to fulfill welfare standards, as described in EU law.

Ensuring animal welfare conditions means no hunger, malnutrition and thirst; lack of fear and suffering; lack of thermal stress or physical discomfort; lack of pain, injury and illness and freedom to express normal behavior patterns. However, there is an interdependence and inclusion relation between these animal welfare requirements, so ensuring a certain level of nutrition must be linked to the other aspects mentioned before.

## 2. MATERIALS AND METHODS

In this present paperwork the qualitative descriptive method was applied, by systematically describing the relationship between the researched phenomena, as well as the method of analytical research of the various information that it is used as data sources.

## 3. RESULTS AND DISCUSSIONS

The animals' nutrition of economic interest is necessary to be achieved as a requirement of metabolizable substrates and energy, first of all, in the direction of maintaining the health of animals, but also for the manifestation of productive performance conferred by their genetic dowry.

Differentiated nutrition requires knowledge of energy requirements, proteins, vitamins, minerals and other biologically active substances, depending on the species, race, age, physiological state, direction of production.

However, if a food is nutritionally rich in nutrients, but, for various reasons, it is rejected by the animal, its value is zero (Parvu Gh. et al. [11]).

This would be the context in which the notion of animal welfare applies, where, in addition to the feeding condition, the other requirements are also met. Nutritional intake should take into account health, environmental conditions, maintenance and service. In the case of growing and fattening animals, deviation from the recommended intake results in a change in weight gain both daily and during a longer period of time, and the development of the body is affected.

Recommended intakes for lactating females are the amounts of nutrients that need to be administered so that the animal can externalize its productive potential without mobilizing its body reserves (Jarrige R. [12]). If these reserves are reached, both the animal's health and its welfare condition are endangered.

The nutritional quality of a feed is reflected in its nutritional value, which is determined by complex analyzes and calculation models that require knowledge of the chemical composition and digestibility coefficients related to energy and protein (Voicu I. [17]).

The feeding norm is established on the basis of nutritional requirements, to which is added a safety factor, in addition to the norm, to prevent unfavorable actions of endogenous or exogenous factors, such as:

- Uncertainties regarding the exact estimation of nutritional requirements;
- The risk of low consumption, due to an unfavorable climatic environment, or inappropriate feed, or due to the genetic background of the animal;
- Uncertainties regarding the quality of raw materials;
- The risk of nutritional imbalance of the ration, which can lead to a decrease in the degree of availability of the administered food;

- Heterogeneity of compound feeds, which depends on the quality of the raw materials used:

- Deterioration of veterinary health, which may alter the digestible and metabolic use of the nutrients and therefore increase the nutritional requirements.

The value of the feed and the feeding norms represent average data, which may vary depending on the conditions in which they were established: environmental conditions - temperature, humidity; race, state of maintenance; the botanical species of the forage plant - the vegetation stage, the harvesting method, the conservation method; the availability of nutrients, which may be altered under certain conditions; the effectiveness of a fodder, which can be influenced by the structure and balance of the ration in which it is included (Parvu Gh. et al. [11]).

In order to avoid undesirable animal behavior, an alternative method may be used, which allows the animal to choose different feed combinations, which, however, ensure the need for nutrients specific to the category and direction of exploitation, therefore not affecting the animals' welfare (FAO, 2012 [3]).

The relation between nutritional level, quality and other animal welfare criteria (Figure 1) is reflected, for example, by the presence or the absence of discomfort, suffering, disease, normal pattern of behavior.

The improper planning of the required quantity of feed as well as the management of lower quality rations result in both inefficient production and adverse effects on the welfare of the animals concerned. In some cases, in extensive systems, farmers are inclined to keep as many animals as possible, even if they cannot be properly fed, but food of adequate quality and quantity allows animals to maintain their welfare, with positive effects on farm profitability (Clive J.C. Phillips [5]).




**Figure 1 - The interdependence between the level and nutritional quality and other animal welfare criteria**

By achieving the welfare condition by ensuring the level and nutritional quality we can ensure the maintenance of the physiological and psychological balance of the animal, as it can better cope with environmental challenges (Ritskes-Hoitinga, M. [10]).

The development of sustainable nutrition strategies requires consideration of nutritional approaches to meet animal welfare goals, while at the same time having a low environmental impact on production systems (Linden J. [6]). There is also a challenge in implementing socio-economic demands on food security for a growing population and at the same time fulfilling animal welfare requirements. In this respect, it is important to take into account the levers for eliminating human-animal competition, in terms of providing food resources for both parties, without prejudice to food safety, on the one hand, or to animal welfare, on the other hand.

The negative impact that food consumption habits have on both the environment and animal welfare has led to reducing the consumption of meat and animal products. It is therefore necessary to assess the balances between nutritional quality, environmental sustainability and animal welfare. However, there are multiple possibilities for optimizing these ratios. The application of a sustainable feeding system is important in order to meet nutritional requirements, limit the impact on the environment and maintain animal welfare (Scherer L. et al. [14]).

The aspects which are practical for animal feeding influence the level of welfare also and it relates to the maintenance systems in place. Therefore, in the free maintenance, on the pasture, a certain degree of autonomy is offered in terms of food selection, and the animals have the possibility to exercise and express their normal behaviors, depending on the space provided.

Welfare in stable conditions can generally be considered to be lower than that of animals that are kept outdoors, and this depends on the management applied at the farm level.

A combined maintenance system, both in the stable and in the open space, on pasture may be the best option for animal welfare, under the conditions of good nutritional management (Madzingira O. [8]).

The systems for intensive production involve the use of permanent shelters and the operation of specialized breeds for high productivity. These systems can restrict the opportunities for movement of animals and the manifestation of their free behavior. The extensive systems are generally considered to have higher potential for animal welfare than intensive ones. Products of animal origin from extensive systems may have nutritional benefits as a result of, for example, the consumption of fresh feed and increased physical activity, improving the quality of meat, milk and eggs (Nutritional benefits of higher welfare animal products [4]).

However, in extensive systems there are certain limitations that need to be taken into consideration. For example, ruminants have a limited time to graze, mainly because they have to devote a significant amount of time to ruminating. Under unfavorable conditions, fatigue affects an animal before its nutritional requirements are

met, and the effects of malnutrition may be exacerbated by environmental factors, such as lack of water, or high ambient temperatures (Temple D. [16]). When we have the case of technological situations that require food restriction instead of ad libitum feed, nutritional adequacy, however, it is necessary to ensure all essential nutrients, in order to avoid malnutrition, discomfort, hunger and impairment (Savenije, B. et al. [13]).

A lot of efforts to optimize the feeding conditions of animals of economic interest have focused on promoting the performance and quality of products, but risks may appear due to the conflict between the high and typical requirements of the species. For example, in the feeding of high-yielding dairy cows, the conflict is obvious: even if they are fed large amounts of concentrates, it becomes increasingly difficult to meet energy needs when milk production exceeds 40 kg of milk per day, and a negative energy balance accompanies a predisposition to ketosis and infertility. Animal nutrition research is increasingly focused on species issues and the requirements that ensure the physiological development of the animal, normal health and behavior. It also evaluates the parameters for characterizing animal welfare, depending on different feeding strategies (Kampfues J. [7]).

In a lot of cases, animals of economic interest are given rations which, even when abundant and nutritious, they are not necessarily adequate, which affects animal welfare negatively. The choice of feeding combinations can also provide animals with a way of coping with toxins, as certain food combinations have the potential to alleviate the negative effects of toxins and reduce stress levels.

Therefore, the choice of food is necessary for each animal to have the freedom to express its normal behaviors. We argue that this freedom allows for the uniqueness of individuals, thus promoting animal welfare and performance and, consequently, increasing the profitability of farmers to ensure animal welfare (Manteca, X. [9]).

The measures that involve biosecurity, animal welfare and nutrition are also needed to prevent disease and minimize the use of antibiotics. Optimal animal nutrition is one of the tools available to reduce the need for antibiotics in animal production. Nutrition influences the critical functions needed for animal protection and disease resistance. Animal nutrition strategies should support these immune systems and reduce the risk of the presence of potential harmful substances such as mycotoxins, pathogenic bacteria and other germs in feed and water (Smits, C.H.M. et al. [15]).

Most of all, the consumers are becoming more and more selective when it's about the consumption of animal feed, medicines administered to them, food supplements, the whole food chain. The food safety continues to be a serious concern, as today's food may contain unwanted things, such as heavy metals, high dioxin levels, mycotoxins. All of these have the potential to enter the food chain through animal feed (Coffey D. [2]).

For example, the presence of toxic stuffs in cow's milk is regulated by the European Commission under the General Food Law (EC Regulation No 178/2002), with official controls on feed (EC Regulation No 152/2009), in order to prevent implications for animal health and to ensure consumer protection (Moran C.A. [1]).

## 4. CONCLUSIONS

There are direct interdependencies between nutritional quality and the welfare of animals of economic interest. It can be said that the nutrition is the most important aspect of the well-being requirements. Without its fulfillment, even if the other aspects are ensured, it is not possible to talk about the welfare of the animals, in conditions of breeding and exploitation. This involves accurately estimating the nutritional requirements, ensuring the right feed, the quality of the raw materials, the nutritional balance of the ration, and ensuring good veterinary health.

The animal nutrition is a zootechnical activity of high interest that ensures the optimal conversion of nutrient resources into animal products. By using the nutritional resources in animal feed, there are ensured the normal development of vital functions and the capitalization of their production and reproduction potential (Voicu I. et al. [17]).

## 5. REFERENCES

[1] Moran C.A., Kettunen H., Yiannikouris A., Ojanperä S., Pennala E., Helander I.M., Apajalahti J., A dairy cow model to assess aflatoxin transmission from feed into milk – Evaluating efficacy of the mycotoxin binder Mycosorb®, Journal of Applied Animal Nutrition 2013, 2, e6.

[2] Coffey D., Dawson K., Ferket P., Connolly A., Review of the feed industry from a historical perspective and implications for its future, Journal of Applied Animal Nutrition 2016, 4, e3.

[3] FAO, Impact of animal nutrition on animal welfare – Expert Consultation 26−30 September 2011 – FAO Headquarters, Rome, Italy. Animal Production and Health Report. No. 1. Rome, 2012.

[4] Nutritional benefits of higher welfare animal products, https://www.ciwf.org.uk/.

[5] Clive J.C. Phillips, Nutrition and the Welfare of Farm Animals – Springer, 2016.

[6] Linden J., Promoting Welfare through Proper Animal Nutrition, 2012.

[7] Kampfues J., Problems in the energy and nutritional requirements of feeding and welfare of food producing animals, 1998.

[8] Madzingira O., Animal Welfare Considerations in Food-Producing Animals, In: Abubakar M., Manzoor, S. (eds.), Animal Welfare, IntechOpen 2018.

[9] Manteca, X., Villalba, J., Atwood, S., Dziba, L., Provenza, F. Is dietary choice important to animal welfare? Journal of Veterinary Behavior: Clinical Applications and Research, 2008.

[10] Ritskes-Hoitinga, M., Strubbe, J. H., Nutrition and animal welfare. In E. Kaliste (Ed.), The Welfare of Laboratory Animals (pp. 51-80), 2007.

[11] Parvu Gh., Costea Mihaela, Pîrvu M., Nicolae B., Tratat de nutriția animalelor, Editura Coral Sanivet, București, 2003.

[12] R. Jarrige, Alimentat ion des bovins, ovins & caprins, INRA, Paris, 1988.

[13] Savenije, B., Strubbe, J., & Ritskes-Hoitinga, M. Nutrit ion, Feding and Animal Welfare. In R.Hubrecht, & J. Kirkwood (Eds.), The UFAW Handbook on the Care and Management of Laboratory and Other Research Animals, Elghth Edition, 2010.

[14] Scherer L., Behrens P., Tukker A., Opportunity for a Dietary Win-Win-Win in Nutrition, Environment, and Animal Welfare, One Earth, 1(3), 349-360, 2019.

[15] Smits, C.H.M., Li, D., Patience, J.F., den Hartog, L.A., Animal nutrition strategies and options to reduce the use of antimicrobials in animal production, FAO Animal Production and Health Papers, Series numebr 184, FAO, Rome, 2021.

[16] Temple D., Manteca X., Animal welfare in extensive product ion systems is still an area of concern, Frontiers in Sustainable Food Systems 2020.

[17] Voicu I., Surdu I., Cișmileanu A., Sava A., Anghel A., Zamfirescu S., Strategii optimizate de hrănire a caprinelor de lapte în condițiile valorificării resurselor furajere specifice României, Marlink Publishing House, București, 2017.

[18] *** Nutriția animalelor | Lege 72/2002, https://lege5.ro/Gratuit/gm4tgobugi/nutritia-animalelor-lege-72-2002?dp=gy3tgobygazte.