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IMPROVING PRODUCTIVITY IN ANIMAL HUSBANDRY BY IMPROVING PRODUCT QUALITY

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Abstract:

The article is devoted to the topical problem of rational use of energy and nutrient content of feed in obtaining livestock products (milk) from cows by shifting the energy balance of the animal's body towards "productive energy", i.e. the synthesis of fat and proteins. The authors would like to point out that one of the main factors influencing fluctuations in the energy balance of an animal are microclimate parameters, as the deviation of the microclimate parameters from the established optimal limits leads to a reduction in milk yields by 10 to 20%. Therefore, the aim of our work is to develop an energy-saving technology for the formation of optimal microclimate in livestock facilities using air conditioning systems, which can regulate most of the parameters of the microclimate inside them, namely: temperature, relative humidity and internal air velocity, concentration of harmful gases (carbon dioxide, ammonia, and hydrogen sulfide), dust and microorganisms. Many technologic equipment and tools made animal husbandry easier and comfortable. Especially management decisions and applications are effected highly ratio with this rapid development. In animal husbandry management decisions that need to be done daily are configured according to the correctness of the decisions to be made. At this point, smart systems give many opportunities to farmers. Milking, feeding, environmental control, reproductive performance constitute everyday jobs most affected by correct management decisions. Human errors in this works and decisions made big effect on last product quality and profitability are not able to be risked. This chapter deal with valuable information on the latest challenges and key innovations affecting the animal husbandry. Also, innovative approaches and applications for animal husbandry are tried to be summarized with detail latest research result

Keywords: control, reproductive animals its chemical composition and calorie content;nutrient digestibility;

INTRODUCTION

Full feeding refers to feeding where rations fully meet the needs of animals not only in energy or calories (general nutrition) determined by feed standards, but also in the necessary quantity and proper ratio of various nutrients and biologically active substances (protein, carbohydrates, fats, macro- and micronutrients and vitamins) [5, 7].

The nutritional value of the feed cannot be expressed by a single indicator. The nutritional assessment of the feed is made up of the following :

1) its chemical composition and calorie content;
2) nutrient digestibility;
3) general (energy) nutrition;
4) protein, mineral and vitamin nutrition value.

Manufacturing of animal products such as meat, milk, eggs, wool, herd reproduction, as well as the use of livestock in agricultural work are associated with the use of energy and its transformation [5, 6]. The main elements of the energy exchange balance are shown on figure 1.

The amount of metabolic energy yielding products other than the body's heat production is also reduced by so-called non-productive energy needs: the energy needs of the animal, consisting of thermoregulation, which is necessary to maintain constant body temperature, and the energy expended on movement [4, 6, 12, 14, 19].

Insufficient energy feeding of animals causes a decrease in dairy, meat and egg productivity and exhaustion of animals, and in their young it can slow down or stop growth, cause a decrease in fertility, ovulation in the uterus and fertilization.

Therefore, the main goal of our work is to shift energy exchange towards productive energy with new technologies and technical means. The increased world population is demanding more reliable quality livestock products the number of farms is decreasing but the number of animals for per farm and animal production are increasing In addition to this trend livestock production problems also increasing [1]. The solution of these problems comes from multidisciplinary studies from very different fields such as technology. In large enterprises it is not possible to obtain the expected performance without using technology and automation systems from animals with very high genetic values. Daily work on livestock farming is simple in and standard application routinely Data monitoring in the modern dairy farm enables the ongoing control of production, animal health, and welfare

CURRENT TECHNOLOGY APPLICATIONS

The benefits of new technology are plentiful and include increased cost efficiency, improved animal welfare, improved working conditions, better production monitoring (e.g. remote monitoring, access to real-time data) and improved provision of important production data. The new technology means producers can work easier and improve cattle welfare, production efficiency, and profitability. Technologic developments provide more efficient, profitable and fast solutions for farmers to get on time process using management and direct manipulation possibilities. Continuous monitoring of disease, and its careful management is essential for the well-being of an animal management [5, 6]. This can be achieved through the detection of early stages and, subsequently, the detection and treatment of the infection. Automation today is super-sophisticated technology and software as well as complicated machinery. A number of computer-assisted image analysis applications are being developed for more convenient animal husbandry. The latest computer programs can identify and classify sounds of animal for specific situations. Many research concluded that these applications could be used to monitor the welfare of animals and provide early identification of disease, physiologic status, and abnormality.

The main technology that livestock farmers requirements met is electronic records, milking, heat detection walk-over-weighing, auto-drafting, genetic improvement, feeding, barn environment optimization, and health recording etc. Some sensors are currently available for this purpose, but they do not fulfill all demands. Also, with advances in proteomics and genomics, new biomarkers are being discovered, allowing the disease to be detected at earlier stages. This will lead to assays with higher sensitivity, which can provide additional quantitative information on the level of inflammation 'on-site' and 'on-line' and which is also faster and less expensive. These technologies provide to dairyman many opportunities to make easier and more convenient their decisions about dairy future plans.

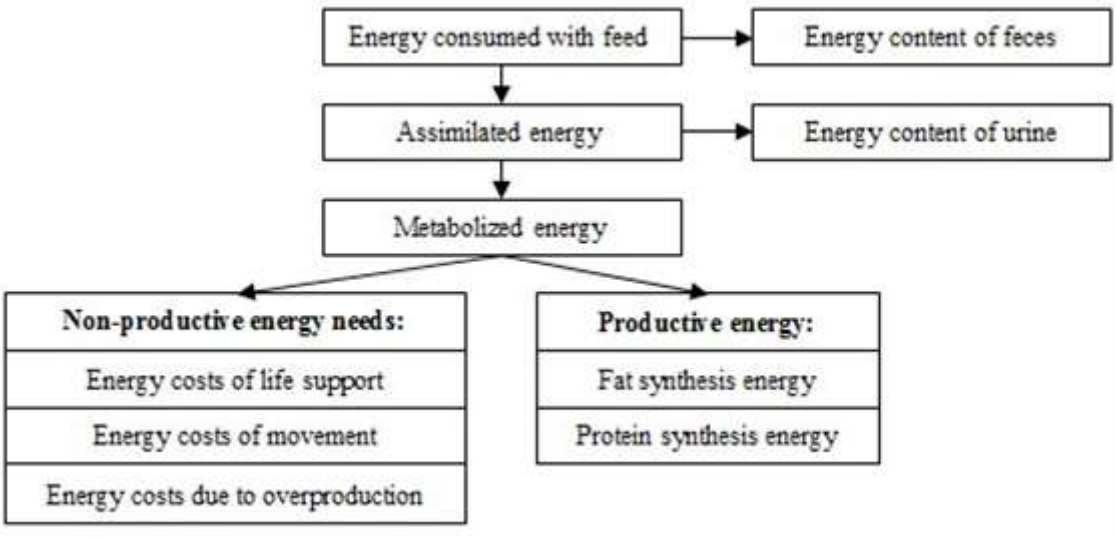

Fig. 1. Highlights of the energy exchange of farm animals.

In dairy farms which very high genetic value of breeding animals cannot get the expected performance without the use of latest technology. Dairy cattle herd management programs if can be used as effectively, dairy farming will have many advantages for consumer, farmer and also animals. Genetic information and type evaluation of herd members and bulls are particularly suitable for expanded electronic updating. However, to obtain these advantages from this system required to have knowledge of the functions and effective use of the functions. The large amount of data in the obtained on many issues related to animals, herd management, and an individual unless used in decisions about animals, ensuring the heavy data flow, record keeping or assessment will not give the expected results. Breeds in animal husbandry has changed a lot with the use of breeding and gene technology. Till 1980s livestock products demands have been met by breed substitution, cross-breeding, and within-breed selection. But these demand in

future is to be met using new techniques such as such as artificial insemination and more specific selection techniques. Genomic selection provides more possibilities for the more high rate of genetic gain in the livestock sector. New technology in computers, biotechnology and scientific discoveries regarding ruminant nutrition and genetics provide the basis for accelerated progress in milk production for those dairy farmers that adopt these technologies. 10 years ago most dairy farmers focused their attention solely on animal husbandry practices. The use of computers for farm management in dairy sector started in as early in 1990s in many developing countries. As personal computer was developed and the price has dramatically declined, more and more farmers began to use computers by themselves in the last decade. But generally, computers have been used by producers with larger farms. Small-scale farmers bypassed the technology because of its cost and their lack of knowledge about computer use in farming. Many computer programs were described, by which data on data in dairy herds may be processed. The some computer software is designed for timely and direct convenience to farmers. Thus, the breeder can evaluate the monthly lots of data using many formulas with high accuracy using these software. It can also be programmed for annual report for detail evaluation of herd evaluation. In addition to all these, daily milk yields feed consumption, pregnancy check, inseminated cow list can be programmed for daily work routine. In recent years there is a form of high interest to cattle breeding and this is leading to the establishment of intensive farms. The only criteria for the life cycle continuity of these intensive farms would be on maximum profitability and competitiveness ability on market. This concept mainly related to forceful usage of knowledge, technology and management at intensive farms and small enterprises and cattle breeding organizations. Whenever the farmers meet any problem in order to refer to an organization for learning to new solutions and the absolute result most probably they prefer to share with farmers who are more experienced for them But developed countries heavily use computer and internet that is the main way to reach information Meanwhile in undeveloped or developing countries, several reasons limit using computer and internet these are listed as high financial cost, difficulties to use technology, loss of knowledge to economic benefits, hesitate to use new technologies, lack of education, strict personality, poor infrastructure, lack of personal experience and not enough time to spent.

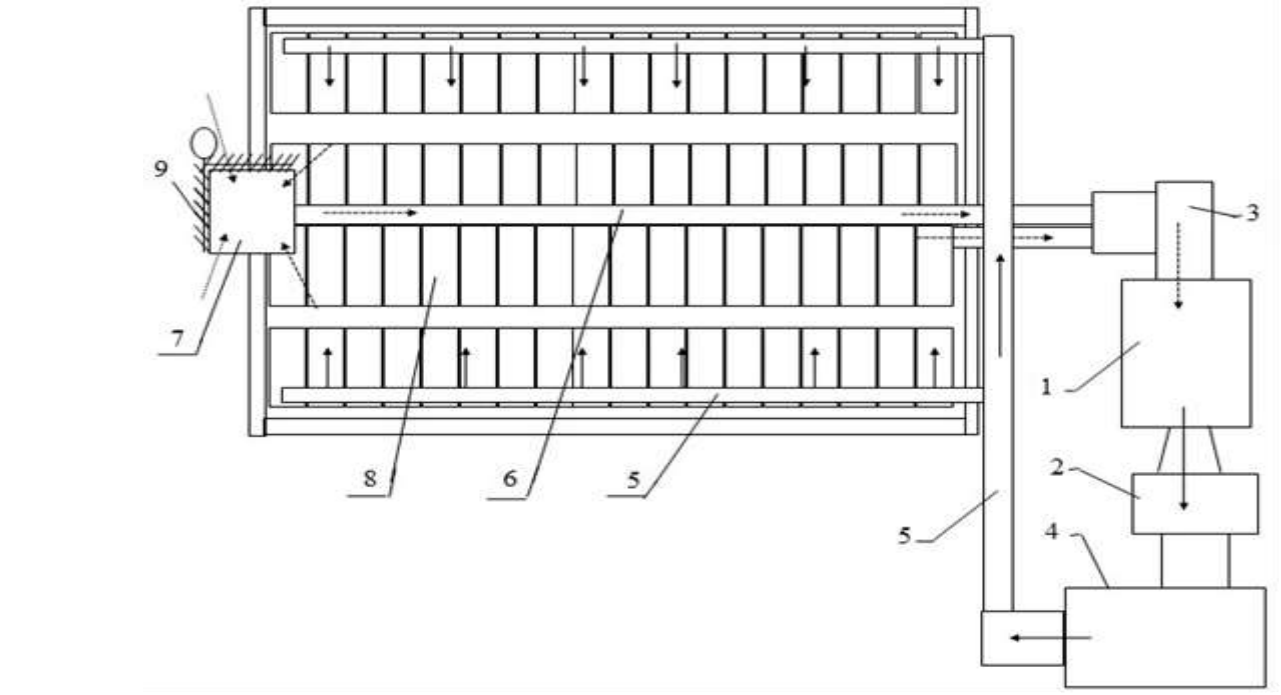

Fig. 2. Energy-saving technology for the formation of the optimal microclimate in livestock facilities with air conditioning (1 – aero-hydrodynamic air conditioning unit bubble chamber; 2 – electric heater; 3 – fan; 4 – fan; 5 – air distribution system; 6 – air dryer; 7 – air dryer mixing chamber; 8 – pens with animals; 9 – louvre valve with actuator;
→ Outside air; ⇢ Recirculated air; ⇢ Clean air).

Electric heater 2 carries out air heating. The air is hydrated and cooled in the air conditioner chamber 1; drying is done by the electric heater 2 and air dryer 6. During the summer, water-evaporative air-cooling is used in the air conditioner chamber To clean the internal air from moisture, an air dryer with a mixing chamber 7 is used, into which the outside and inside air is sucked in. The automatic mode of operation of the mixing chamber eliminates icing during the winter. Then this mixture moves along the air dryer 6 and is additionally heated by the air in the upper zone of the room (in this case, moisture condenses on the outer surface of the air dryer and drains onto the lower V-shaped apron and is drained into the sewer). The fan of air conditioner 3 feeds the main flow of contaminated air into the chamber, where it is moisturized and cleaned from ammonia, carbon dioxide, hydrogen sulfide, dust and microorganisms, and then treated with the electric air heater 2. Air is supplied to the room through an air distribution

system 5. The polluted air is removed from the upper zone of the room using natural ventilation shafts. The Electronic identification system is started 1970s. However, current laws deal with the visual, readable markings that are placed on the animal (EU Directives 92:102:EEC and EU Directives 820:97:EC). There are numerous animal ID technologies available to livestock producers. Radio frequency identification (RFID) will likely be used to identify cattle. These devices have an electronic number that will be unique for an individual animal and link that animal to the database. Electronic ear tags, injectable transponders and boluses with a transponder, inside in the reticulum are the latest technology for animal identification technology . Many types of RFID tags (boluses, ear tags, injectable glass tags) are used subcutaneous placement for animal identification. These systems work using radio frequency for sending data. Boluses retain in the first two stomachs of the ruminants and accepted as safe for animal health. They can be administered even to lambs after weaning at the fifth week and the retention rate can reach 100%. The milking robots equipped with sensors to detect signs of mastitis which measures the many characters of the abnormal milk pH, Somatic cell count, milk acidity, milk conductivity etc. systems also can be regarded milking specifications of the system such as parlor performances, milking efficiency etc. [5]. Simple automatic cup removal devices monitor the milk flow rate from individual cows and at a threshold, the milking vacuum is shut off and the system is activated to withdraw the cups from the cow. Post-milking teat disinfection is an established component of many mastitis control strategies. This is normally performed manually in many farmers using either a pressure operated spray lance or more a dip cup. Behavior meter also installed to the milking systems for animal monitoring. The behavior meter continuously records the lying time, lying bouts and the activity of the individual animals. The cow-behavior observations enable animal welfare assessment in different environmental conditions and stressful situations, as well as reproductive and health status. Another options to separation gate usage at automatic management systems.

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