ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Increasing The Genetic Potential Of Cattle By Improving The Technological Process Of Feeding.

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ABSTRACT

The relevance of the issue under consideration is due to the need to significantly increase the production of essential food products, which include milk and meat of cattle. The tendency of increasing the production of this product, outlined in most regions of the country, is achieved by increasing the productivity of animals, but the growth rates of this indicator remain low. The purpose of the article is to describe one of the ways to improve the quality of feeding cattle using technology, when not the feed is brought to the animal, and the animal itself approaches the feeding trough. The developments of scientists of the Stavropol Agrarian University in this direction are given. The material of the article will be useful not only for managers and specialists of farms engaged in dairy and beef cattle breeding but also for designers developing equipment for cattle farms.

Keywords: cattle, genetic potential, feeding, feeding.

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ISSN: 0975-8585

INTRODUCTION

The process of feeding cattle is fundamental in improving the efficiency of dairy and beef cattle breeding. The unsatisfactory quality of feeding, along with the conditions of keeping animals, is one of the main reasons for the low level of utilization of the genetic potential of cattle, which, according to the Ministry of Agriculture of the Russian Federation in dairy cattle breeding, does not exceed 60%. On the other hand, the applied technologies and means of mechanization for the delivery and distribution of feed on cattle farms predetermine not only the energy and labor costs per unit of produced products, but also affect the efficiency of feeding and feed loss.

The main source of energy, protein and biologically active substances for cattle are bulky food in the form of hay, haylage, and silage. In many regions of the country, the technology of harvesting fodder with pressing into bales and rolls is of increasing interest, which significantly reduces these losses during transportation and storage. However, there is a problem with the grinding and distribution of feed, as this process requires additional devices, and, consequently, investment and energy costs.

The solution to this problem should be a device that satisfies the requirements of universality both in relation to species and gender and age groups of farm animals, as well as in relation to the main groups of food fed to these animals. The use of such devices in the form of self-feeders allows you to exclude the use of shredders - distributors, significantly reduce labor and energy costs, since they are loaded, usually once in 2 ... 3 days.

The currently existing types of cattle feeding troughs, as a rule, are bulky and material-intensive, allow significant feed losses and do not provide a front for simultaneous feeding of a group of animals in accordance with zootechnical requirements. In addition, analysis of various designs of cattle feeders, both domestic and foreign, showed that they also have the following serious disadvantages:

- allow significant feed loss;
- do not have universality in relation to different age and sex groups of cattle;
- not universal in relation to the distribution of various types of feed.

This necessitates the improvement of the design parameters of the feeder in the direction of:

- universality in relation to gender and age groups and the breed composition of cattle;
- universality in relation to the types of feed distributed (loose, extruded);
- exclusion of irrecoverable feed loss;
- ensuring the most comfortable conditions for the process of feed consumption;
- the possibility of carrying out other activities with animals (blood sampling, hoof treatment, etc.).

The solution of these problems in the aggregate will significantly increase the level of use of the genetic potential of cattle, both dairy and meat, which is the goal of this work.

MATERIALS AND METHODS

To achieve the goal, the methods of statistical data processing of the Ministry of Agriculture and the State Statistics Committee of the Stavropol Territory on the status of dairy and beef cattle were used. The materials of our own theoretical and experimental research in the field of improving technologies and means of mechanization for feeding cattle were used.

RESULTS AND DISCUSSION

In the trough of any design, the most important element is the shape of the dividing grid, which predetermines both the comfort of feeding and irrecoverable feed loss. We took three variants of the separation grids presented in Figure 1 for the study. The permissible feed losses were determined by weighing, and the time the animal stayed in the feeding zone was recorded using a laboratory setup (Fig. 2).

ISSN: 0975-8585

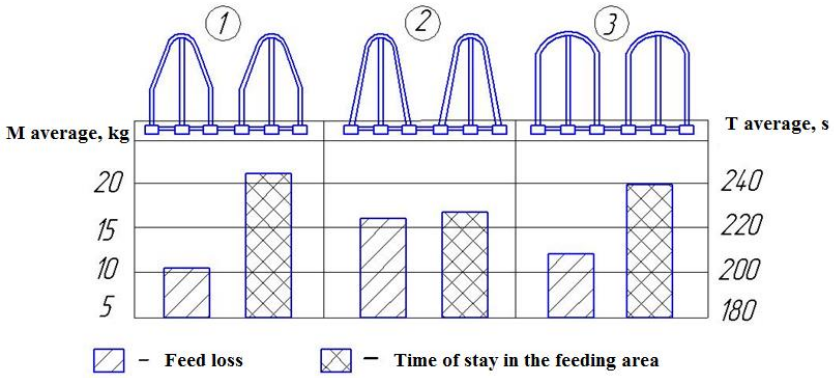
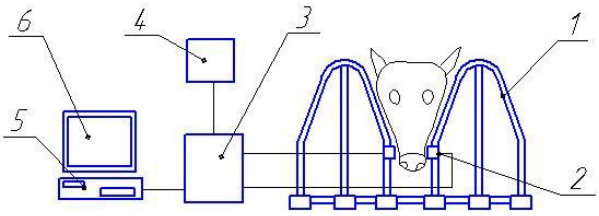


Figure 1: Versions of the separation grids



1 - separation grid: 2 - photoresistors; 3 - pulse accumulator; 4 - counter; 5 - system unit; 6 – monitor

Figure 2: Diagram of the laboratory setup

Analysis of the data obtained shows that the minimum feed loss is observed when using the grid form number 1. At the same time, such a separation grid provides the most time the animal stays in the feeding area, which indicates the most comfortable feeding conditions. The constructive dimensions of this lattice are determined to take into account the averaged biometric parameters of animals and are presented in Figure 3.

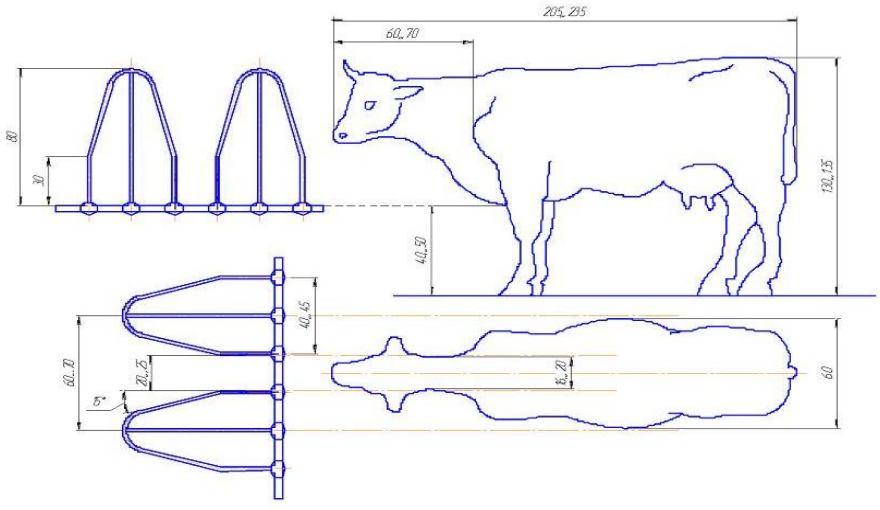


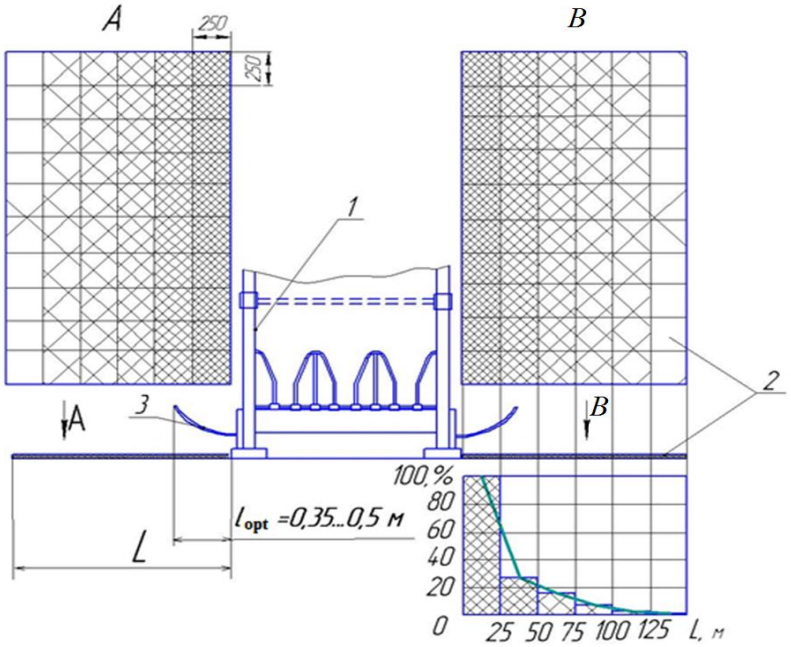
Figure 3: Dimensions of the separation grid

When conducting research to determine feed losses during the feeding process, it was established that their size depends not only on the shape and size of the separation grid, the presence, and height of the limiter installation but also on the size of the feed particles. It was revealed that with increasing length of feed particles, its losses increase, which is explained by their higher coherence. The animal, capturing a portion of food, tends to leave the feeding area and chew food. Particles of food in the oral cavity carry adjacent

ISSN: 0975-8585

particles, which, when displaced during movement, lose contact with each other and fall off. This process is most intensely observed when feeding loose hay and hay in a roll.

By observing the process of feeding cattle using a feeder, it was found that animals lose a significant portion of feed in a certain area of width L = 1250 mm from the edge of the self-feeder (Fig. 4).

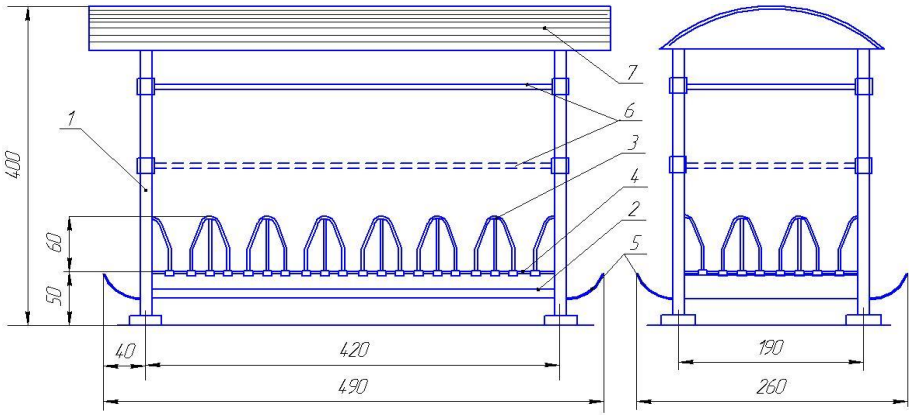


1 - feeding; 2 - grid; 3 - feed catchers

Figure 4: Distribution of feed loss (%) depending on the distance from the edge of the self-feeder

The research methodology was as follows. Along the perimeter of the feeder, on the outside of the feeding front, a 1250 mm wide grid made of wire with a diameter of 0.8 mm with cells 250 x 250 mm in size was laid on the ground, as shown in Figure 4. Then, the lost food was collected from each cell, summarized by remote areas and weighed on electronic scales. The data were recorded in the observation log and then processed.

Analysis of the obtained results shows that most of the feed loss is in the area of 0 ... 0.5 m from the edge of the feeder. Thus, installing around the perimeter of the feeder catchers made in the form of a gutter (pos. 5, fig. 5) with a departure from the edge of 0.35 ... 0.5 meters will reduce irrecoverable feed losses by 75 ... 80%.



1 - stand; 2 - bottom; 3 - dividing grid; 4 - bar; 5 - feed catchers; 6 - limiter; 7 - roof

Figure 5: Cattle Feeder

Based on the results of research by scientists at Stavropol State Agrarian University, a feeder was developed and tested under production conditions for feeding cattle feed both in loose and compressed form. Figure 6 shows the design and dimensions of this feeder based on the maintenance of 50 cattle.

If necessary, adjustment of the distance between the separating arcs is provided depending on the biometric parameters of the animals.

CONCLUSION

The developed model of the feeder will allow increasing the level of utilization of the genetic potential of dairy and meat cattle by providing high quality and comfort of the feeding process.

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