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CHEWING BEHAVIOR AS IMPORTANT MONITORING INDEX OF COWS' HEALTH AND WELFARE

Koziy V.I., Doctor in veterinary sciences, professor, Bila Tserkva National Agrarian University, Bila Tserkva, Ukraine
ORCID: https://orcid.org/0000-0002-8221-6678
Poroshynska O.A., PhD in veterinary sciences, associate professor, Bila Tserkva National Agrarian University, Bila Tserkva, Ukraine
ORCID: https://orcid.org/0000-0001-9882-1963
Shmayun S.S., PhD in veterinary sciences, associate professor, Bila Tserkva National Agrarian University, Bila Tserkva, Ukraine
ORCID: https://orcid.org/0000-0001-6458-6336
Stovbetska L.S., PhD in veterinary sciences, associate professor, Bila Tserkva National Agrarian University, Bila Tserkva, Ukraine
ORCID: https://orcid.org/0000-0002-6672-5560
Kozii N.V., PhD in veterinary sciences, associate professor, Bila Tserkva National Agrarian University, Bila Tserkva, Ukraine
ORCID: https://orcid.org/0000-0002-0141-4390
Lukianenko K.E., assistant professor, Bila Tserkva National Agrarian University, Bila Tserkva, Ukraine
ORCID: https://orcid.org/0009-0003-9869-6375
Koshelyev O. V. Doctor in veterinary medicine, animal behavior consultant Bila Tserkva, Ukraine
ORCID: https://orcid.org/0009-0001-6686-5985

The purpose of our work was to estimate the relevance and the importance of the use of chewing behavior as a monitoring index for cows' health and welfare. It was concluded that the use of ruminating indexes for monitoring dairy cows' health and welfare is an important part of modern dairy management system. Current research in this field should be focused on incorporating the behavior and ruminating indexes in to the economical, food safety, reproduction and preventive medicine strategy on dairy farms.

The keeping and feeding conditions of dairy cows has changed significantly over the past decades. The bulk of recent literature provides new insights on the importance of ruminating activity for dairy cows' digestion and the use of ruminating indexes for monitoring dairy cows' health and welfare.

The main purpose of our work was to estimate the relevance and the importance of the use of chewing behavior as a monitoring index for cows' health and welfare.

Materials and methods. We monitored the literature data on the use of chewing behavior for the estimation of feeding or disease prevention practices in dairy and beef industry. Science Direct and PubMed engines there were used. The relevant articles were taken into account and its brief summary elaborated and noted.

Results and discussion. It is well known that promoting chewing activity increases salivary secretion in dairy cows [1-5]. In theory that might reduce the risk of rumen acidosis and others concomitant pathologies, however, the influence of chewing time on rumen buffing is not yet well documented [6]. Through, I. Kröger et al. [7] showed that cows that spent less time ruminating have more pronounced reticular pH drop.

Currently the cow accelerometers are widely used to monitor cows' behavior and rumination [8-11]. Galli J.R. et al. [12] found that ingestive sounds are accurate enough to predict the herbage intake rate in grazing cattle.

Many authors consider that chewing behavior is an important factor determining dairy cows' health and welfare [13-16]. It was found that increased chewing rate may contribute to enhancing

feed digestibility [17]. Pahl C. et al. [18] found that the chewing time is suitable for estimating feed intake (r=0.780).

As a rule, chewing activity increases when proportion of bigger corn silage particle size in total mixed ration increased [19]. Kargar S. and Kanani M. [20] fed dry (AH) or reconstituted (RAH) alfalfa hay (90.9 vs. 66.6% DM for AH vs. RAH, respectively) to 20 neonate male Holstein calves (10 in each group). They found that RAH diet tended to increase meal frequency (preweaning) and meal duration (pre- and postweaning), without affecting nutrient intake. The calves also had tendencies for increased rumination frequency and rumination duration during the preweaning period. Blood concentrations of total protein and globulin tended to be higher in calves fed RAH diet. Calves fed AH diet were more susceptible to develop diarrhea and pneumonia. Using the data one can contemplate that the main primary result of diet moistening is the increased eating and rumination time. It favors the feedstuff digestion and disease susceptibility. The other study [21] also confirmed that increased chewing time prevent ruminal acidosis. The authors explain it by decreased ruminal acid production but one may be inclined to give a credit to increased saliva ruminal buffering.

Some others authors did well designed experiments studying the cows' tolerance to high-carbohydrate diets. Gao X. and Oba M. [22] found that the cows tolerant to the high-grain diet (as to severity of subacute ruminal acidosis development) showed less sorting behavior but what is unusual, had used less chewing time. In our opinion this data prompt the need to broaden the study of rumination beyond the total chewing time.

This review article done by E. Humer et al. [23] summarized common direct and indirect cow signals related to subacute ruminal acidosis in dairy cows. The authors performed a scientific evaluation of each of cow signals by highlighting their advantages and disadvantages from the practitioner's point of view. They found that observation of chewing and feeding activities could be reliable and robust markers of subacute ruminal acidosis that are easily accessible and inexpensive.

The aim of the study done by A. Haselmann et al. [24] was to evaluate the effects of reducing forage particle size from 52 mm to 7 mm in high-forage diet on dairy cows' sorting behavior, feed intake, chewing activity, and performance. It was found that cows fed smaller particle size reduced eating and ruminating time per kilogram of dry matter intake by 4.8 and 1.9 min, respectively. The other study [25] also confirms that a moderate increase in the particle size of alfalfa hay in dairy cows' diets increases chewing activity and elevates nutrients intake.

Kargar S. et al. [26] showed that chewing activity can be effectively manipulated by changing the forage: concentrate ratio of diet. The authors found that chewing activity was greater for cows fed the richer forage rations. Substitution of corn silage with shredded beet pulp lead to decrease in chewing activity of dairy cows [27].

Ahmadi F. et al. [28] studied the performance and feeding behavior of dairy cows fed high-concentrate diets containing steam-flaked or ground corn varying in particle size. It was found that rumination activity (min/d) and total chewing activity (min/d) were not affected by processing or particle size. Replacement of long hay with the pelleted corn cob diet decreased rumination activity [29].

Effects of feeding live yeast on feeding behavior of dairy cows under heat stress were studied by M.C. Perdomo et al. [30]. The authors found that interval between rumination bouts tended to decrease linearly (122, 96.5, and 90.7 min) and chewing time per kilogram of NDF tended to increase linearly (71.6, 71.3, and 81.6 min/kg) with increasing dose of live yeast.

Suarez-Mena F.X. et al. [31] found that greater forage particle length had no effect on rumen fermentation or chewing behavior. Large differences in diet forage particle size awoke only slight differences in chewing and ruminating behavior, and no changes in rumen fermentation, milk production, or milk components were noted [32].

The main body of the reviewed literature use rumination indexes for the monitoring of feeding efficiency, clinical status and the diseases presentation in dairy and beef cattle [33-37]. I many cases the scientists try to use them to predict or evaluate the influence of feedstuff, additives or processing methods on physiological parameters and ruminal digestion. In most of the cases the

results are promising. The accuracy of monitoring devises is gradually improving. In most cases the main constraining factor of its wide usage is economical consideration.

Conclusion. The use of ruminating indexes for monitoring dairy cows' health and welfare is an important part of modern dairy management system. Current research in this field should be focused on incorporating the behavior and ruminating indexes in to the economical, food safety, reproduction and preventive medicine strategy on dairy farms.

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COMPARATIVE ASSESSMENT OF TOXICOLOGICAL PROPERTIES OF ZINC NANOPARTICLES DEPENDING ON DOSAGE AND CHEMICAL STRUCTURE

Koshevoy V.I., PhD (Vet. Med.), State Biotechnological University, Kharkiv, Ukraine
ORCID: https://orcid.org/0000-0003-2938-2762

Introduction. Nanoparticles (NPs) of metals, including zinc, can be successfully used to meet the mineral sources of animals and poultry, they are able to increase the rate of growth and their use of feed [1]. It is known that zinc oxide nanoparticles (ZnO-NPs) are superior to conventional sources of zinc in terms of pharmacological activity and bioavailability, have a positive effect on productivity and antioxidant defense, increase reproductive potential, but require detailed clarification of toxicological parameters [2]. It has been proven that the release of Zn^{2+} from ZnO-NPs triggers the synthesis of an excessive amount of intracellular reactive oxygen species, which leads to the autophagic death of immune cells and confirms their potential impact on animal immunity. In addition, the results indicate that ZnO-NPs can be used as an effective fungicide [3, 4].

Recently, the use of metal NPs for the correction of trace element diseases in animals and poultry has become widespread, the main condition of which was a comprehensive assessment of their toxicological properties in order to prevent negative effects on the body and its functions [5].