PRESENCE OF SELECTED NITROGEN COMPOUNDS IN COWS' BLOOD THROUGHOUT THE SEASONS OF THE YEAR

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Introduction

The environment in which animals live influences on their health, productivity and fertility, which in turn have influence on their metabolism. The research carried out by Kuczaj and Blicharski (2005), Veissera et al. (2004) and Silanikove (2000) showed that in the most optimal thermo-humidity conditions, both total and protein nitrogen levels rise, as well as gamma-globulins to the expense of albumins. Ames et al. (1980), Ras (1999) Hanigan et al. (2004) pointed out that it was essential to achieve a balance between energy and protein levels in feedstuff. Animals that were exposed to environmental pressures had a lower concentration of urea in their blood and their livers (Back et al. 2000, Danfaer, 1990; Bobe et al., 2004, Zähner et al. 2004; Regula et al. 2004). The research carried out in past years proved that changes in the nitrogen compounds in cows' serum blood depend not only on nutrition, but also on the relation between protein and energy levels, as well as the conditions the animals are kept in. The aim of the study was to determine the influence of climatic conditions in different seasons on various nitrogen compounds in cows' serum blood.

Material and methods

The study was carried out in 4 different seasons on 33 milk cows. The animals were kept in controlled conditions, with a lack of freestyle system. The cow-house microclimate was measured according to the temperature and humidity levels and accumulation of harmful gases. The blood samples were taken from a neck vein in monthly intervals, and they were used to measure: the protein nitrogen, ammonia, urea and nitrogen aminate. Nitrogen compounds of urea and ammonia were statistically shown.

Results and discussion

As shown in table 1 the study of microclimatic conditions carried out in different seasons, showed considerably different results, in most cases far

from acceptable for milk cows. The main factors that contributed to such results were: insufficient lighting and poor ventilation of the buildings, poor insulation of walls and poor sewerage.

Table 1. Microclimate at the cowshed

Season	Statistical means	Temperature ^{0}C	Relative humidity %	Cooling power W/m^2	CO_2 ppm	NH_3 Ppm	H_2S ppm
Winter	x	6,33	84,88	494,9	4949	19,6	5,29
	S_x	0,57	3,09	41,87	320	3,9	0,7
Spring	x	13,09	75,00	341,2	4379	68,6	6,28
	S_x	1,71	4,56	6,28	306	3,1	0,95
Summer	x	20,11	65,03	231,9	4093	70,8	4,71
	S_x	1,72	6,36	20,1	288	9,8	0,86
Autumn	x	11,67	89,50	30,3	4166	69,2	4,83
	S_x	0,92	3,11	43,5	289	7,7	0,69

Previous studies carried out on milk cows (Kuczaj, Blicharski , 2005; Baranski et al. 2005, Beerda et al. 2004) showed that there was a link between conditions the animals were kept in and morphological and biochemical blood indicators.

Table 2 shows a formation of nitrogen compounds in cows' blood. Protein nitrogen was at its lowest level during winter time (823,22 ± 51.85 mmol/l), and the highest during spring (962,73 ± 67,86 mmol/l). During these seasons, the N ammonia was at similar levels, respectively 156,2 ± 61.2 i 419,6 μmol/l. Urea nitrogen and nitrogen aminate levels were irregular, being at their lowest levels during winter.As seen in the study, nitrogen levels in cows'blood were within their physiological standards (Hanigan et al. 2004; Back et al. 2000; Inverteen and Anderson, 2004).

Table 2. Level of nitrogen compounds in blood serum of dairy cows

Season	Statistical means	*N-protein mmol/l*	*N-urea mmol/l*	*N-aminate mmol/l*	*N-ammonia μmol/l*
Winter	x	***823,22***	***0,75***	***1,10***	***156,2***
	S_x	***51,85***	***0,14***	***0,51***	***61,2***
Spring	x	***962,73***	***1,59***	***1,31***	***419,6***
	S_x	***67,86***	***0,36***	***0,18***	***170,4***
Summer	x	***833,55***	***1,76***	***1,76***	***194,4***
	S_x	***64,93***	***0,26***	***0,29***	***32,0***
Autumn	x	***949,60***	***1,34***	***1,46***	***218,1***
	S_x	***85,28***	***0,25***	***0,26***	***49,3***

Conclusions

1. Microclimatic conditions of cow-sheds were not within acceptable standards.
2. In more complex conditions, there was a low concentration of protein nitrogen and a higher concentration of non-protein nitrogen.

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