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EFFECT OF PREPARTUM SUPPLEMENTATION OF YEAST CULTURE (*SACCHAROMYCES CEREVISIAE*) ON BIOCHEMICAL PARAMETERS OF DAIRY COWS AND THEIR NEWBORN CALVES

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Abstract

FRÖHDEOVÁ MARTINA, MLEJNKOVÁ VERONIKA, LUKEŠOVÁ KATEŘINA, DOLEŽAL PETR. 2014. Effect of Prepartum Supplementation of Yeast Culture (*Saccharomyces Cerevisiae*) on Biochemical Parameters of Dairy Cows and Their Newborn Calves. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis,* 62(5): 897–904.

The aim of our experiment was to compare the effect of different levels of the addition of *Saccharomyces cerevisiae (S.c.)* yeast culture on feed carrier to the current ration MK DOJ Levucell SC 20, Saccharomyces cerevisiae CNCM I-1077 (E 1711) 20.10^{10} CFU on the blood parameters of high-pregnant breeding cows and their calves. The experiment included 42 breeding cows of the Czech Fleckvieh cattle breed and their calves. The breeding cows were divided into two age groups, each of 21 heads. The first group included heifers and the second group consisted of cows on the 2nd and higher lactation. Each age group had 7 control animals (Heifers/Cows – control), 7 animals receiving 50 g of yeast culture on the feed carrier per head and day (Heifers/Cows – 50 g), and 7 animals receiving 150 g of yeast culture on the feed carrier per head and day (Heifers/Cows – 150 g). Blood of the animals was sampled three times during the experiment – two times in the cows and one time in their calves. The first blood sample was taken from the breeding cows before the start of feeding the yeast culture ca. 23 days before the expected parturition (Cow –23). The second blood sample was taken from the breeding cows within 24 hours after birth (Cow +2) and the third blood sample was taken from the calves on the 3rd–4th day after birth (Calf +4). Parameters ascertained in the processed serum were: immunoglobulines G (IgG), crude protein (CP), gamma glutamyl-transferase (GGT), urea, glutamate-pyruvate-transaminase (GPT) and glutamate-oxaloacetate-transaminase (GOT). Results of our experiment, which lasted from 16.3 to 28.6 (105 days) showed IgG in the serum of cows on the 2nd and higher lactation in the control group (3.8 ± 1.48 mg/ml) was statistically significantly lower ($P < 0.05$) in the blood sample Cow +2 than in the serum of cows in the 2nd and higher lactation fed with the lower concentration of *Saccharomyces cerevisiae* at the same sampling (15.9 ± 11.41 mg/ml). This correlates also with the fact that the content of IgG antibodies in the serum of calves after the cows on the 2nd and higher lactation in the control group (3.9 ± 2.06 mg/ml) was statistically significantly ($P < 0.05$) lower than that of calves after the cows on the 2nd and higher lactation with the lower concentration of *Saccharomyces cerevisiae* (14.6 ± 8.67 mg/ml). As to the higher addition, no statistically significant difference of the effect on the IgG content was recorded ($P < 0.05$).

Keywords: blood serum, immunoglobulines G, crude protein, gamma glutamyl-transferase, enzymes

INTRODUCTION

In most farm animals, the transfer of immune antibodies between the mother and the foetus during gravidity occurs through the placenta, which makes the transfer possible. In cattle, the transfer of antibodies between the cow

and the calf does not occur during pregnancy because cattle have a syndesmochorial type of placenta, which makes such a transfer impossible. Thus, the calf is directly dependent on the intake of high-quality colostrum with a sufficient amount of antibodies from the mother (Šlosárková *et al.*, 2011). Passive immunity of the calf is therefore provided by the high concentration of antibodies, IgG in particular, in the absorbed foremilk (Kováč *et al.*, 2001). There are three types of immunoglobulines in the foremilk of cattle: IgG, IgM and IgA. Immunoglobuline G (IgG) forms approx. 70% of all immunoglobulines, which constitute the most abundant class of antibodies in the blood. If the calf does not receive a sufficient dose of immunoglobulines in the foremilk, it would not have enough immunity for overcoming various illnesses. The timely and ample supply of foremilk after the parturition is therefore vitally important. During the first hours after the parturition, the alimentary tract of young calves has a capability of absorbing the whole molecules of immunoglobulines. This capacity gradually decreases with time. Shortly after birth, young calves can absorb ca. 50% of antibodies from the foremilk. The amount of absorbed antibodies decreases to mere 15% within the following 20 hours and 36 hours after the birth it is only negligible (Jelínek *et al.*, 2003). IgG is present in the whole organism, namely in all internal and external mucous membranes. IgG antibodies are received by animals in the first hours of their life from intestines into the blood circulation and demonstrably occur in the blood up to half a year of their age, protecting the young calves especially from viral as well as from bacterial diseases.

Yeast and yeast cultures are currently the most common microbial feed additives given to dairy cows. Their task is to boost ruminal fermentation because the optimally functioning rumen is a key condition for the high performance and productive health of animals (Čermáková *et al.*, 2013). This is confirmed Erasmus *et al.* (1992) and Chaucheyras-Durand *et al.* (2008).

The aim of our experiment was to investigate the effect of feeding different levels of the addition of *Saccharomyces cerevisiae* yeast culture on blood parameters, IgG, CP and some enzymes in particular, as health indicators of breeding cows and their calves.

MATERIAL AND METHODS

The experiment included two age categories of cows (heifers and cows in the 2nd and higher lactation), divided into groups according to the amount of the *Saccharomyces cerevisiae (S.c.)* addition on feed carrier to the existing ration and was administered individually. It was the product MK DOJ Levucell SC 20, Saccharomyces cerevisiae CNCM I-1077 (E 1711) 20.10^{10} CFU, Delacone. The content of nutrients in the ration was calculated from tabular values as follows. Animals were so fed up to move to the stable production, which took place on the 4th day after birth. Refer Tabs. I and II.

I: *Composition of the ration for breeding cows the original mass*

Feed	kg
Brewer's grains	2
Meadow hay	2
Maize silage	6
Lucerne-grass silage	18

II: *Contents of nutrients in the ration*

Parameter
17.24 g PDIN / MJ NEL
14.12 g PDIE / MJ NEL
28.44 g NL / MJ NEL
191.73 g DM / MJ NEL

The first age category of heifers was divided into three groups by 7 animals: the control group with no *S.c.* addition (Heifers – control), the first experimental group with a *S.c.* addition of 50 g on the feed carrier (Heifers – 50 g), and the second experimental group with a *S.c.* addition of 150 g on the feed carrier (Heifers – 150 g). The second age group contained cows on the second and higher lactation divided in the same manner (Cows – control, Cows – 50 g, Cows – 150 g). The addition of *S.c.* was fed once a day with the morning ration. S.c. was served individually a were homogeneously mixed in to the diet. The experimental dairy cows originated from cattle breeding farm in the Pardubice region, namely ZD Radiměř.

The groups were monitored during their pre-parturition stanchion housing, which allowed individual feeding of the cows. All monitored dairy cows were kept in the same compartment of the stable and their moisture and temperature conditions in the stable were identical too. Cows were gradually included in the experiment. The experiment included also the monitoring of calves from the experimental mothers. The calves were stalled in individual boxes and received the foremilk from their mothers.

Blood was sampled three times during the experiment. Two blood samples were taken from the breeding cow and one blood sample was taken from its calf:

1) The first blood sample was taken from the high-pregnant cows and heifers ca. 23 days before the expected parturition. The blood was collected by the veterinarian from *vena coccygea* and the sample was designated as Cow –23.
2) The second blood sample was taken from the cows within 24 hours after birth, and the sample was designated as Cow +2.
3) The third blood sample was collected from the *vena jugularis* of calves born after the experimental cows on the third or fourth

day after birth and the sample was designated as Calf +4.

All blood samples were taken by the veterinarian into the Hemos sampling tubes used for the sampling of cattle blood. All samples were taken at the same daytime to eliminate disturbance of the time schedule and feeding times of the experimental animals. The blood was transported to the Hospital in Svitavy where the serum was separated on the laboratory centrifuge at 3,500 rpm for 10 minutes. Labelled serum samples were kept in a freezer. Upon the completion of the whole set, the samples were brought to the laboratory of LABtechnik Brno for crude protein (CP) analyses by biuret reaction and for the establishment of bovine IgG antibodies from the biological samples by using the method of sandwich enzyme immunoassay (ELISA). These measurements were completed by the establishment of gamma glutamyl-transferase (GGT), urea, glutamate-pyruvate-transaminase (GPT) and glutamate-oxaloacetate-transaminase (GOT) in the laboratory of the Mendel University in Brno, Department of Animal Nutrition and Forage Production. These parameters were established on the Reflovet Plus automated biochemical analyzer (Scil, Germany).

The experiment started with the first blood sampling from cows and heifers more than three weeks before the expected calving date. The addition of *S.c.* started to be given on the second day after the blood sampling and could be fed individually thanks to the stanchion stabling. The addition of *S.c.* was fed until the calving day. Subsequently, a blood sample was taken from the cow, which was then replaced by another cow in the experiment. The procedure was repeated until the number of animals required for the experiment was reached. Research results were statistically processed by using Microsoft Excel and the Statistica 10.0 programme with the Tukey HSD test (Snedecor and Cochran, 2012).

RESULTS AND DISCUSSION

Although the immune system of newly born calves is well developed, it is not fully mature yet. Thus, the calves are capable of immune response to antigens but the response is weak and slow. Actually, the calves are born agamaglobulinemic due to the type of placenta (Pavlata *et al.*, 2005). The placental transfer of maternal antibodies into the foetus does not occur during gravidity and the transfer of passive immunity in dairy cattle is then provided by the accumulation of extremely high concentrations of antibodies, namely IgG, in the foremilk (Kováč *et al.*, 2001). Antibody is understood a protein, which has a capacity to identify as part of the immune system and render harmless foreign objects (bacteria and viruses) in the body (Tvrzník *et al.*, 2008). The passive transfer of maternal immunoglobulines from cows to calves depends on several consecutive processes. During the first of them, the cow has to develop specific resistance to the microflora of the environment in the stable, which is achieved by a sufficiently long stay in the birthing barn (Pavlata, 2009). The foremilk of cows has to exhibit a sufficiently high concentration of IgG and the calf must not only receive this high-quality foremilk in an adequate quantity but also absorb it within a certain time after birth (Skřivanová, 1997). The amount of absorbed antibodies – immunoglobulines is influenced by the quality of colostrum and by the maturity of the calf's alimentary tract. Stomachs of newly born calves contain only little acids and proteolytic enzymes in the first hours after birth, which allows the transfer of intact immunoglobulines into the intestine and their further absorption from the intestine into the blood (Bárta *et al.*, 2008).

The amount of G class serum immunoglobulines in adult and healthy breeding cows should range from ca. 17.6–22.9 g/l (Bárta *et al.*, 2008). Some other authors mention an IgG range from 16.2–26.0 g/l (Dvořák *et al.*, 2005); Bouda and Jagoš (1979) claim an IgG range from 22.6 ± 5.3 g/l. If a breeding cow shows increased IgG in the serum, it may suggest an illness. If the IgG content is increased by 5 to 10%, it may indicate an infection (Bárta *et al.*, 2008). The level of IgG in healthy calves with a sufficient supply of foremilk should be higher than 10 g/l (Pavlata *et al.*, 2005). Bárta *et al.* (2008) claim an average IgG value for a healthy calf to be 12.74 g/l. In a attempt to Erhard *et al.* (1999) measured a higher average value og the calves 22.5 mg IgG/ml (n = 7, SD = 6.8). This values are little higher than our measurements. IgG values in the blood samples

III: *Immunoglobulins G (IgG) values in breeding cows and their calves (mean ± S.D) [mg/ml]*

	IgG		
	Cow –23	**Cow +2**	**Calf +4**
Heifers – Control	17.6 ± 9.22	23.4 ± 12.57[4]	16.3 ± 11.29
Cows – Control	4.5 ± 4.70	3.8 ± 1.48[1]	3.9 ± 2.06[2]
Heifers 50 g	23.1 ± 17.01	21.4 ± 9.08[3]	16.1 ± 12.11
Cows 50 g	13.6 ± 10.20	15.9 ± 11.41[1]	14.6 ± 8.67[2]
Heifers 150 g	6.0 ± 8.16	5.8 ± 4.61[3,4]	10.5 ± 9.53
Cows 150 g	9.8 ± 7.05	7.2 ± 5.88	13.9 ± 14.79

Values with the same index between them have a statistically significant difference. $P < 0.05$ $x^{1,2}$, $P < 0.01$ $x^{3,4}$.

taken from the experimental breeding cows ca. 23 days before the parturition (Cow –23), two days after the parturition (Cow +2) and from the calves are presented in Tab. III.

The above results show that none of the groups of cows exhibited increased average IgG levels, which could have suggested an illness. Values were consistent with the attempt to Herr *et al.* (2011) where the IgG values were 15.0 ± 6.4 mg/ml. The authors also believe that the decline of immune substances in the period around birth reflects the physiological status of dairy cattle. The calves after cows in the control group exhibited lower IgG values, which might have indicated either a deficient foremilk supply or that the transfer was functional but the amount of immunoglobulines in the mothers was already low.

We studied the effect of feeding various concentrations of *Saccharomyces cerevisiae* (S.c.) on the IgG level in the serum of breeding cows. Our results showed that IgG in the serum of Cows – Control was lower ($P < 0.05$) in the blood sample Cow +2 than in the serum of Cows 50 g at the same sampling. This correlates also with the fact that the content of IgG antibodies in the serum of Calf +4 after the Cows – Control was lower ($P < 0.05$) than that of Calf +4 after the Cows 50 g. Other statistical significances suggest that the content of IgG antibodies in the serum of Heifers 50 g was higher ($P < 0.01$) in the blood sample Cow +2 than in Heifers 150 g at the same sampling. The content of IgG antibodies in the serum of Heifers – Control was higher ($P < 0.01$) in the blood sample Cow +2, too, than that in the serum of Heifers 150 g at the same sampling. Summarizing these findings, we can conclude that the lower *S.c.* addition exhibited a significant effect on the IgG content in both the serum of cows and their calves. The effect of the higher *S.c.* addition was statistically non-significant.

If the calf does not receive an adequate supply of foremilk or the foremilk is of poor quality (IgG content), the transfer of colostral antibodies fails (FPTA). Agree with this statement Hernández-Castellano *et al.* (2014). Bárta *et al.* (2008) maintain that the IgG content in colostrum should range from 44.5–103.4 g/l to avoid the low transfer of colostral antibodies (FPTA) and hence the health hazard to the calves. Calf with the deficient transfer can be considered a calf with IgG < 8 g/l in the serum or plasma. The threshold value for the concentration of the serum IgG content suggesting an increased threat of infectious disease depends on the environment and on the pathological load to which the calf is exposed (Skřivanová, 1997). Absorption of IgG colostrum is affected primarily by the time of the first colostrum administration, mode of its supply, quality, sex of the calf, breed, acid-base status of the calf, environment temperature and stress of the calves (Pavlata *et al.*, 2005).

The establishment of crude protein may be one of important health indicators. The level of crude proteins in the serum may suggest anomalies (Bárta *et al.*, 2008). Crude protein values recorded by various authors in adult animals considerably differ sometimes; it is therefore necessary that all reference laboratories will have ascertained minimum and maximum values for healthy animals with using standard procedures in the given laboratory (Bárta *et al.*, 2008). Some studies claim a range from 60–74 $g.l^{-1}$ (Bárta *et al.*, 2008), some other ones a range from 65–85 $g.l^{-1}$ (Dvořák *et al.*, 2005). Radostits *et al.* (2007) mention a narrower range from 60–70 $g.l^{-1}$. On the other hand, Bouda and Jaroš (1979) claim a wider range from 74 ± 9 $g.l^{-1}$.

In their study focused on metabolic disorders in calves, Pavlata *et al.* (2012) claim the mean values of crude proteins recorded on 23 farms to be 56.20 $g.l^{-1}$. Podhorský *et al.* (2007) state that the mean CP value is 53.63 $g.l^{-1}$. According to Bárta *et al.* (2008), healthy newborns should reach 60–80% of the value of adult animals. Then the level of proteins gradually increases until the calves reach sexual maturity. Šlosárková *et al.* (2011) maintain that the lower limit for CP in calves is 55 $g.l^{-1}$, which corresponds to a sufficient supply of colostral substances.

Crude protein values increase in the animals especially due to organism dehydration and chronic inflammatory processes (Dvořák *et al.*, 2005). This indicates the results of the experiment Piccione *et al.* (2012) where the average value of the annual total protein test are 77.6 g/l. If we consider only the month in which our experiment was carried out, the values are even higher, 80.1 g/l^{-1}. The difference between our measured values and the values discussed may be caused by different climate. Attempt Piccione took place in Sicily. Other reasons for the increased CP level may be parasitic or mixed infections, myeloma and autoimmune diseases (Bárta *et al.*, 2008). The decreased CP level may indicate long-term starvation (Dvořák *et al.*, 2005) or liver disease, loss of proteins due to glomerulonephritis, IgG deficiency, and disorders of food digestion and absorption (Bárta *et al.*, 2008).

The CP levels are presented in Tab. IV. Compared with the above-mentioned values, our measurements can be valuated as appropriate in both the breeding cows and their calves. They corroborate the good health condition of the animals, which correlates with the resulting IgG values. Similar conclusions reached by cows Tóthová *et al.* (2014). The level of crude protein in the serum of Calf +4 after Heifers 150 g is higher ($P < 0.05$) than that recorded in the Calf +4 after Heifers 50 g.

GGT – gamma-glutamyl-transferase is one of the enzymes used in the diagnostics of health disorders in dairy cattle. The enzymatic diagnostics is used primarily in diagnosing hepatopathy, myopathy and osteopathy. The principle dwells on the establishment of the activity of enzymes in the blood plasma or tissues. Under normal physiological conditions, the activity of determined enzymes is low. If an organ is affected, intracellular

IV: *Crude protein (CP) levels in breeding cows and their calves (mean ± S.D) [g/l]*

	CP		
[g/l]	**Cow –23**	**Cow +2**	**Calf +4**
Heifers – Control	70.0 ± 5.13	72.0 ± 4.14	56.7 ± 6.57
Cows – Control	75.0 ± 4.15	74.8 ± 3.19	62.9 ± 6.83
Heifers 50 g	68.6 ± 4.04	70.0 ± 2.29	56.1 ± 3.78
Cows 50 g	72.3 ± 2.04	71.8 ± 4.83	61.9 ± 7.78
Heifers 150 g	67.0 ± 2.53	75.4 ± 14.18	66.6 ± 10.65[1]
Cows 150 g	75.5 ± 3.78	72.3 ± 2.78	59.4 ± 11.93

Values with the same index between them have a statistically significant difference. $P < 0.05$ x[1].

enzymes are washed out into the blood stream due to the changed permeability of cell membranes or following the disintegration of cells of the affected organ, and the activity of these enzymes in the blood plasma would increase by several times. Diagnostic value of establishing the individual enzymes is limited by the specific character of the enzymes as well as by the half time of their disintegration. GGT is a membrane-bound enzyme with a high activity in liver, pancreas, kidneys and small intestine. The increased GMT activity in blood is diagnosed especially in the case of cholestasis (Dvořák *et al*., 2005).

In adult breeding cows, the GGT enzyme is a good indicator of health condition. In calves, it indicates an adequate foremilk supply, which has to be controlled. The foremilk supply can be objectively checked by examining the blood of the calves either by the direct establishment of IgG in the serum by using accurate serological methods (ELISA) or by indirect verification with using the GGT enzyme which is transferred from the colostrum into the blood circulation and indicates the transfer of antibodies (Šlosárková *et al*., 2011).

Dvořák *et al*. (2005) report reference values for healthy adult animals ranging from 0.14–0.55 µkat/l. The level agrees with Jelínek *et al*. (2003) who claim a range from 0.1–0.6 µkat/l. In calves, the level of GGT as an indicator of the transfer of antibodies is claimed to be adequate if ranging about 10 µkat/l. Target GGT values are considered those exceeding 14 µkat/l GGT (Šlosárková *et al*., 2011; Pavlata *et al*., 2005).

The GGT values measured by us are within the range of reference values both in the adult breeding cows and in their calves. However, in comparing the results of experiment Delfino *et al*. (2014) we measured values are low. Statistical significances indicate that the GGT enzyme in the serum of Heifers – Control was lower ($P < 0.05$) in the blood sample Cow –23 than that in the serum of Heifers – Control in the blood sample Cow +2.

- The GGT enzyme in the serum of Heifers 50 g was lower ($P < 0.05$) in the blood sample Cow –23 than that in the serum of Heifers 50 g in the blood sample Cow +2.
- The GGT enzyme in the serum of Heifers 150 g was lower ($P < 0.01$) in the blood sample Cow –23 than that in the serum of Heifers 150 g in the blood sample Cow +2.
- The GGT enzyme in the serum of Heifers – Control was lower ($P < 0.05$) in the blood sample Cow –23 than that in the serum of Heifers 50 g at the same sampling.
- The GGT enzyme in the serum of Heifers – Control was lower ($P < 0.01$) in the blood sample Cow –23 than that in the serum of Heifers 150 g at the same sampling. The GGT values are presented in Tab. V.

GPT – glutamate-pyruvate transaminase is an ubiquitary enzyme, which is present in liver, kidneys, heart and skeletal muscles. It is an intracellular enzyme occurring in the cytoplasm as well as in mitochondria. Its importance in the diagnostics of liver disorders in ruminants is low because its representation in hepatocytes is low as compared with the other organs (Dvořák *et al*., 2005). GPT and GOT enzymes are indicative, evaluates stresses thet affect blood components. Increased activity of these enzymes is related to physiological status and is also an accompanying

V: *Gamma glutamyl-transferase (GGT) levels in breeding cows and their calves (mean ± S.D) [µkat/l]*

	GGT		
	Cow –23	**Cow +2**	**Calf +4**
Heifers – Control	0.18 ± 0.051[1,4,5]	0.37 ± 0.201[1]	12.51 ± 8.437
Cows – Control	0.36 ± 0.115	0.45 ± 0.306	15.49 ± 13.898
Heifers 50 g	0.26 ± 0.062[2,4]	0.49 ± 0.251[2]	12.79 ± 8.507
Cows 50 g	0.31 ± 0.054	0.38 ± 0.076	14.71 ± 6.306
Heifers 150 g	0.30 ± 0.029[3,5]	0.42 ± 0.093[3]	21.15 ± 15.984
Cows 150 g	0.36 ± 0.083	0.32 ± 0.117	14.18 ± 15.091

Values with the same index between them have a statistically significant difference. $P < 0.05$ x[1,2,4], $P < 0.01$ x[3,5].

phenomenon metabolism disorders (AL-Saeed *et al*., 2009). The values of GPT for the second collection (+2) decreased slightly compared to the first sampling (–23). In our experiment, the measured values agree with the reference values, indicating Dvořák *et al*. (2005), namely 0.15–0.95 µkat/l. GPT activity did not differ ($P < 0.05$) between experimental and control groups. Values calves were measured as an additional indicator. The GPT values are presented in Tab. VI.

GOT – glutamate-oxaloacetate transaminase is an ubiquitary enzyme occurring in liver, heart, skeletal muscles and intestinal mucosa. It is a cellular enzyme localized in both the cytoplasm and mitochondria. GOT increases at acute disorders of liver, heart and skeletal muscles (Dvořák *et al*., 2005; Hashemnia *et al*., 2014). The literature indicates values 0.72–1.41 µkat/l. We can assume that the slight elevation of GOT occurs due to load around the time of birth. GOT activity did not differ ($P < 0.05$) between experimental and control groups. According Zumbo *et al*. (2011) are values GOT and GPT enzymes higher in calves than their mothers because metabolic activity of the liver is higher. This trend is confirmed in our experiment. GOT values are presented in Tab. VII.

Urea – is a final product from the degradation of proteins; it is synthesized in liver and excreted via kidneys. A certain fraction of urea is recycled through the alimentary tract wall and returned into the forestomachs with saliva. The concentration of urea in the blood plasma is a very good indicator of nitrogen intake and metabolism, giving a picture about the excretory capacity of the kidneys and synthetic capacity of liver. Dvořát *et al*. (2005) believe that the values of urea should be in the range from 3.0–5.0 mmol/l. Our readings this range comply. Urea activities did not differ ($P < 0.05$) between experimental and control groups. Values calves were measured as an additional indicator. The Urea values are presented in Tab. VIII.

VI: *Glutamate-pyruvate-transaminase (GPT) levels in breeding cows and their calves (mean ± S.D) [µkat/l]*

	GPT		
	Cow –23	**Cow +2**	**Calf +4**
Heifers – Control	0.50 ± 0.040	0.41 ± 0.043	0.17 ± 0.042
Cows – Control	0.43 ± 0.033	0.35 ± 0.079	0.18 ± 0.039
Heifers 50 g	0.56 ± 0.093	0.41 ± 0.044	0.17 ± 0.026
Cows 50 g	0.40 ± 0.085	0.32 ± 0.061	0.15 ± 0.024
Heifers 150 g	0.46 ± 0.101	0.43 ± 0.085	0.13 ± 0.016
Cows 150 g	0.43 ± 0.080	0.33 ± 0.065	0.19 ± 0.056

VII: *Glutamate-oxaloacetate- transaminase GOT levels in breeding cows and their calves (mean ± S.D) [µkat/l]*

	GOT		
	Cow –23	**Cow +2**	**Calf +4**
Heifers – Control	1.94 ± 0.594	2.04 ± 0.280	1.03 ± 0.310
Cows – Control	1.48 ± 0.178	2.46 ± 0.523	1.03 ± 0.441
Heifers 50 g	1.84 ± 0.306	2.07 ± 0.282	0.88 ± 1.161
Cows 50 g	1.84 ± 0.358	1.78 ± 0.270	0.96 ± 0.149
Heifers 150 g	1.79 ± 0.331	2.31 ± 0.982	0.95 ± 0.304
Cows 150 g	1.88 ± 0.453	2.07 ± 0.249	1.06 ± 0.482

VIII: *Urea levels in breeding cows and their calves (mean ± S.D) [mmol/l]*

	Urea		
	Cow –23	**Cow +2**	**Calf +4**
Heifers – Control	3.54 ± 0.274	3.41 ± 0.099	3.36 ± 0.054
Cows – Control	5.06 ± 0.835	4.22 ± 0.873	4.15 ± 1.624
Heifers 50 g	3.87 ± 0.872	3.55 ± 0.236	3.77 ± 1.088
Cows 50 g	4.43 ± 0.695	3.62 ± 0.457	3.34 ± 0.017
Heifers 150 g	4.00 ± 0.727	3.93 ± 0.594	4.08 ± 0.953
Cows 150 g	5.00 ± 0.810	4.09 ± 0.677	3.71 ± 0.938

The concentration of urea in the blood increases due to following reasons:

a) Imbalanced ration composition – relative or absolute deficiency of energy and readily digestible carbohydrates, excessive nitrogen substances.
b) Impaired health condition – disorders of the excretory function of the kidneys, urinary canal rupture or obstruction, organism dehydration, muscle tissue catabolism, ketoses – if the function of the liver has not been significantly impaired.

The concentration of urea in the blood decreases due to following reasons:

a) Imbalanced ration composition – relative or absolute surplus of energy, deficient nitrogen substances.
b) Impaired health condition – if the function of liver has been seriously impaired (Dvořák *et al*., 2005).

CONCLUSION

Our experiment conducted at a breeding farm of the Czech Fleckvieh cattle provided an overview of the health condition of breeding cows and their calves, mapping at the same time the effect of the *Saccharomyces cerevisiae* addition on feed carrier to the current ration MK DOJ Levucell SC 20, CNCM I-1077 (E 1711) 20.10^{10} CFU. We can conclude that according to indicators used by us, the herd is healthy.

The aim of this study was to investigate the influence of the addition of *Saccharomyces cerevisiae* at various concentrations into the ration of dry standing cows and to evaluate the health condition of the cows and their calves. Our experiment was conducted in an agricultural cooperative ZD Radiměř and included 42 cows of the Czech Fleckvieh cattle breed and their calves. All cows were receiving the same ration. They were divided into 2 age groups consisting each of three sub-groups by seven animals according to the addition of *Saccharomyces cerevisiae.*

Blood samples were taken from the breeding cows some 23 days before the parturition (Cow –23), 24 hours after the parturition (Cow +2) and from their calves 3rd–4th days after the birth (Calf +4). The blood samples were analyzed for IgG, CP, GGT, urea, GOT and GPT. The experimental results showed that the IgG level in the serum of cows on the 2nd and higher lactation in the control group was statistically significantly ($P < 0.05$) lower in the blood sample Cow +2 (3.8 ± 1.48 mg IgG/ml) than that in the serum of cows on the 2nd and higher lactation with the lower concentration of *Saccharomyces cerevisiae* at the same sampling (15.9 ± 11.41 mg IgG/ml). This correlated with the finding that the content of IgG antibodies in the serum of calves after cows on the 2nd and higher lactation in the control group (3.9 ± 2.06 mg IgG/ml) was statistically significantly ($P < 0.05$) lower than that in the calves after cows on the 2nd and higher lactation with the lower concentration of *Saccharomyces cerevisiae* (14.6 ± 8.67 mg IgG/ml).

From the results of many scientific papers is evident that the addition of yeast culture has positive effects on rumen fermentation and digestion. In our experiment we can conclude that with the addition of a lower amount *Saccharomyces cerevisiae* also increases the level of IgG in serum at higher lactations cows and then the level of IgG in serum their calves. It can therefore be concluded that overall improved health status of cows and their calves.

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