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# Serum biochemical parameters in suckling piglets with low and average birth mass

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**ABSTRACT**

The most significant losses in the pig farming occur during the preweaning period, especially in piglets with birth mass less than 1000 g. Newborn piglets are physiologically immature and gradually establish individual metabolic mechanisms. Furthermore, a great deal of energy is used for maintenance of body temperature, and they are undergoing intensive bone construction, as well as muscle growth and fat tissue synthesis. For these reasons the values of some serum biochemical parameters change continuously until weaning, and exceed the reference values of adult animals. The aim of this study was to observe changes in concentrations of serum biochemical parameters in two groups of Yorkshire piglets during the preweaning period: one group consisted of piglets with birth mass less than 1000 g (low birth mass piglets, n = 24) while in the other group were their littermates with mass at birth ≥1000 g (piglets with average birth mass, n = 24). Blood samples for biochemical analysis were collected on the 1st, 7th, 14th and 21st days of life. In the group of small piglets we observed lower serum glucose levels on the 1st day of life ($P<0.05$), as well as lower creatinine concentrations at the age of 14 and 21 days ($P<0.05$). Also, concentrations of triacylglycerol and urea were significantly higher ($P<0.05$) in the two week old piglets with low birth mass. Concentrations of serum total protein, globulin and creatinine in both groups were still below the reference values at weaning, while the concentration of cholesterol was higher.

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Some of the differences determined between the two observed groups indicate that birth mass may influence the physiological maturity of animals.

**Key words:** piglets, birth mass, preweaning period, serum biochemical parameters

## Introduction

Breeding measures and selection of modern swine genotypes (pig breeds and hybrids) have led to increases in litter size, which have resulted in greater heterogeneity of piglet birth mass, and decreased preweaning survival (CABRERA et al., 2012). Furthermore, the neonatal death rate of piglets during the first three days of life is the most significant in comparison with other intensively bred animals (SVENDSEN et al., 1991; TUCHSCHERER et al., 2000; MILLIGAN et al., 2002; EKERT KABALIN et al., 2008; KIRKDEN et al., 2013). Numerous studies have shown the significance of birth body mass and temperature for neonatal vitality and further growth of suckling piglets (HOY et al., 1994; TUCHSCHERER et al., 2000; MILLIGAN et al., 2002; QUINIOU et al., 2002; JOHANSEN et al., 2004; CUTLER et al., 2006; CABRERA et al., 2012; EKERT KABALIN et al. 2012a). Also, birth mass is strongly associated with traits of economic importance, from preweaning to finishing (FIX, 2010). There are different criteria for determination of "underweight piglets", but numerous pieces of research have indicated 1000 grams as the boundary that influences vitality, growth performances and carcass composition. NGUYEN et al. (2011) and EKERT KABALIN et al. (2012b) stated that piglets with birth mass less than 1000 g are tiny, frequently avital, maintain thermoregulation processes with more difficulty, and because of their greater surface-area-to-volume ratio, body temperature loss is higher. Some studies pointed that lower birth mass is associated with a reduced number of muscle fibers in piglets, which emphasizes that light birth mass pigs begin life with reduced potential for further growth (GONDRET et al., 2005; REHFELDT and KUHN, 2006). In competing for the tit, they get the weakest ones and the amount of the suckled colostrum is smaller (DEVILLERS et al., 2011; VÁCLAVKOVÁ et al., 2012; FERRARI et al., 2014). Therefore, the resorption of mother's globulin from colostrum is poor, so they are more prone to illnesses and death, and their growth is weaker during the further period (QUINIOU et al., 2002; CUTLER et al., 2006; CABRERA et al., 2012).

The data required for more accurate physiological description of the whole suckling period in the recent publications are insufficient, in spite of the great economic importance of neonatal death rate, and especially bearing in mind the influence of birth mass on later growth and losses. Furthermore, obtained mean values of some biochemical parameters reported by other authors present a broad range (EGELI et al., 1998; EKERT KABALIN et al., 2008; 2012b; SZYMECZKO et al., 2009). Neonatal piglets are neurologically relatively mature, but physiologically immature, especially with regard to the systems which included glucogenesis and lypogenesis (SVENDSEN et al., 1991; MOTA-ROJAS et al., 2011). As liver functions are not fully developed right after birth, protein synthesis is limited, causing low concentrations of total serum protein and albumin. Further on, it was determined that the serum protein concentration, glucose, free fat acids and cholesterol are increased after taking colostrum (EGELI et al., 1998; FERRARI et al., 2014). As quantity of serum protein decreases with the breakdown of mother's antibodies, neonatal animals start synthetizing their own immunoglobulins by acquiring immune competency (KANEKO et al., 2006). DAVIS et al. (2000) stated that the piglets with low birth mass were not physiologically mature as heavier ones. According to MOTA-ROJAS et al. (2011), differences in the maturation of the glycogenolytic and gluconeogenic pathway may be expected.

The aim of this study was to determine average concentrations of serum biochemical parameters in Yorkshire piglets with low and average birth mass during suckling period.

## Materials and methods

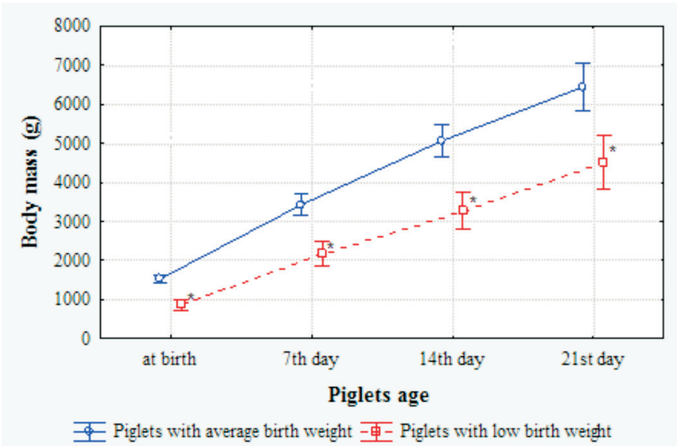
Study comprised 48 Yorkshire piglets from 17 litters. All animals were held in farrowing unit under the same automatic controlled conditions (temperature 22°C with space heating for piglets at 28-31°C, relative humidity 55-65%, illumination of 80-100 lux, air circulation up to 0.3 m/s, while concentration of harmful gases was within tolerable limits). In order to diminish the influence of external factors (the manner of holding and feeding), genetic influence of mother (milk yield) and sex of piglets as much as possible, in each litter where a piglet of low birth mass was studied (one or more), offspring of the same sex was being observed as control. Group of small piglets comprised 24 animals with birth mass less than 1000 g, while the group of piglets with average birth mass contained 24 newborn animals that mass at birth 1000 g or more. Prestarter feed mixture was offered to piglets from 7$^{th}$ day. The weaning was done between 21 and 25 days.

Samplings were performed on the 1$^{st}$ (day of birth was considered to be day 0), 7$^{th}$, 14$^{th}$ and 21$^{st}$ day of the piglet's life, between 9 and 11 am. Blood samples were taken from the *vena cava cranialis* (1.5 ml) in sterile SST tubes. Biochemical parameters in serum (total serum protein, albumin, glucose, triacylglycerol, cholesterol, urea, bilirubin, creatinine) were analyzed with the automatic analyst Olimpus AU 600 (Diagnostica GmbH, Wendenstrasse 14-18, Hamburg, Deutschland, EU), while serum globulins were calculated by subtracting the albumin from the total protein (RADIN and WELLMAN, 2014)

Statistical reference programme Statistica for Windows v.12 (StatSoft Inc., 2014) was used for data analyses. Obtained results are presented with mean and standard deviation or with median, lower and upper quartile (parameters that were not normally distributed). Significance of differences between groups was determined with Student T-test or Mann-Whitney U-test (depending on normality of values distribution). For determining the significance of differences between successive results of individual parameters within two groups we used ANOVA Repeated Measures (with Unequal n HSD test for posthoc analysis) or Friedman analysis and Kendall Coeff. of Concordance. Statistically significant differences are presented at two levels: P<0.01 and P<0.05.

**Results**

Piglets' birth mass, as well as body mass at days of sampling is presented on Fig. 1. Significant difference in body mass at birth observed between two groups (P<0.01) remained at the same level till weaning.




Values are presented with mean while vertical bars denote 0.95 confidence interval

Fig. 1. Changes in body mass of two groups of piglets during preweaning period. *Statistically significant difference according to the piglets with average birth mass (P<0.01).

In newborn piglets greater variability of individual metabolites was observed. Concentrations of serum biochemical parameters in two groups of piglets during the suckling period are presented in Tables 1 - 7.

Between two groups of piglets, statistically significant differences were not determined either in the serum total protein level, or in albumin concentration (Table 1). In both groups, similar changes in concentration of serum total protein during the suckling period were visible. The values at the end of that period were statistically lower (P<0.01) compared to the determined values on the first day of life, and still below the reference values for pigs (KANEKO et al., 2006). Increasing in albumin concentration after birth caused significantly higher values at the end of the suckling period in comparison to the initial ones (P<0.01). This growth was the most intensive during first two weeks. Due to the development and maturation of animals and intensified albumin synthesis, physiological values for pigs were reached already after 7 days. In both groups of piglets globulin concentration was lower than the reference values for pigs (KANEKO et al., 2006). Highest values were found in newborn animals, followed by a significant decrease due to the degradation of the maternal immunoglobulins (P<0.01). In the group of piglets with average birth mass a slight increase was observed during the third week of life causing significant higher value compared to the small piglets (P<0.05) at the end of suckling period.

Table 1. Concentration of total serum proteins, albumin and globulin in two groups of suckling piglets

| Parameter | Piglets age | Piglets with low birth mass Mean ± SD | Piglets with average birth mass Mean ± SD |
|---|---|---|---|
| Total serum proteins (g/L) | 1st day | 63.92 ± 9.29 | 66.29 ± 7.49 |
| | 7th day | 57.45 ± 10.12 | 60.55[aa] ± 10.28 |
| | 14th day | 55.28 ± 4.14 | 54.64[aa] ± 3.84 |
| | 21st day | 54.29[b] ± 4.18 | 55.68[b] ± 4.43 |
| Albumin (g/L) | 1st day | 13.23 ± 4.15 | 14.66 ± 6.00 |
| | 7th day | 25.05[a] ± 5.02 | 26.49[a] ± 4.85 |
| | 14th day | 34.12[a] ± 4.39 | 31.90[a] ± 4.92 |
| | 21st day | 33.87[b] ± 4.44 | 32.13[b] ± 5.63 |
| Globulin (g/L) | 1st day | 50.69 ± 9.64 | 51.64 ± 8.89 |
| | 7th day | 32.40[a] ± 11.85 | 34.06[a] ± 9.09 |
| | 14th day | 21.15[a] ± 3.77 | 22.74[a] ± 5.07 |
| | 21st day | 20.42[*b] ± 2.33 | 23.55[b] ± 4.03 |

* statistically significant difference according to the piglets with average birth mass (P<0.01); [a]statistically significant difference according to the previous value within the group (P<0.01); [aa]statistically significant difference according to the previous value within the group (P<0.05); [b]statistically significant difference according to the value at the 1st day of life within the group (P<0.01)

Recorded statistically significant lower glucose value (P<0.05) in the blood of newborn piglets with birth mass less than 1000 g (Table 2) could be the result of a smaller reserve of fat tissue after birth and higher glucose degradation as the energy source for body warmth maintenance. Since animals in the group of piglets with average birth mass had greater amount of energy reserve and usually suckled colostrum easier and faster (as described earlier in this paper), the higher glucose level was expected to be recorded. Observed serum glucose level in both group of piglets increased during the first week followed with slight decrease in third.

Table 2. Serum glucose concentration in two groups of suckling piglets

| Parameter | Piglets age | Piglets with low birth mass | Piglets with average birth mass |
|---|---|---|---|
| | | Mean ± SD | Mean ± SD |
| Glucose (mmol/L) | 1st day | 5.65** ± 1.48 | 6.57 ± 1.58 |
| | 7th day | 6.94[a] ± 1.79 | 7.80[aa] ± 0.93 |
| | 14th day | 7.87 ± 1.34 | 7.76 ± 0.69 |
| | 21st day | 6.77 ± 1.34 | 6.66[aa] ± 1.35 |

** statistically significant difference according to the piglets with average birth mass (P<0.05); [a]statistically significant difference according to the previous value within the group (P<0.01); [aa]statistically significant difference according to the previous value within the group (P<0.05)

During the research period, higher serum triacylglycerol values were in a broad range in both observed groups, especially in newborn animals (Table 3). Although median value was higher in newborn piglets with average birth mass, during the rest of suckling period these values were lower compared to the small ones. At the end of the suckling period, statistically significant lower values (P<0.01) compared to the 1st day of life were recorded in both groups.

Table 3. Triacylglycerol concentration in serum of two groups of suckling piglets

| Parameter | Piglets age | Piglets with low birth mass | | Piglets with average birth mass | |
|---|---|---|---|---|---|
| | | Median | Lower - upper quartile | Median | Lower - upper quartile |
| Triacylglycerol (mmol/L) | 1st day | 2.31 | 1.82-4.62 | 2.57 | 1.84-3.84 |
| | 7th day | 1.68 | 1.18-2.78 | 1.58[aa] | 1.12-1.99 |
| | 14th day | 1.62** | 1.33-2.01 | 1.30 | 0.94-1.76 |
| | 21st day | 1.41[b] | 1.14-1.70 | 1.34[b] | 0.74-1.88 |

** statistically significant difference according to the piglets with average birth mass (P<0.05); [aa]statistically significant difference according to the previous value within the group (P<0.05); [b]statistically significant difference according to the value at the 1st day of life within the group (P<0.01)

Determined mean cholesterol values during preweaning period in both groups were higher than reference range for pigs (KANEKO et al., 2006) (Table 4), as was expected after colostrum and milk ingestion. Though these values were lower in heavier piglets, a significant higher concentration with regard to small piglets (P<0.05) was observed before weaning.

Table 4. Cholesterol concentration in serum of two groups of suckling piglets

| Parameter | Piglets age | Piglets with low birth mass | Piglets with average birth mass |
|---|---|---|---|
| | | Mean ± SD | Mean ± SD |
| Cholesterol (mmol/L) | 1st day | 3.31 ± 1.30 | 2.89 ± 1.18 |
| | 7th day | 4.15 ± 1.66 | 3.98[a] ± 0.63 |
| | 14th day | 4.63 ± 1.18 | 4.36 ± 1.02 |
| | 21st day | 3.61** ± 1.22 | 4.72[b] ± 1.96 |

** statistically significant difference according to the piglets with average birth mass (P<0.05); [a]statistically significant difference according to the previous value within the group (P<0.01); [b]statistically significant difference according to the value at the 1st day of life within the group (P<0.01)

In the low birth mass piglets a higher serum urea level was recorded during the whole preweaning period although these differences were not significant, except on 14th day of life (P<0.05) (Table 5). Higher nitrogen amount from urea pointed to faster catabolism of proteins, in order to covered energy needs. Mean urea concentration in piglets with low birth mass was within reference ranges for pigs (KANEKO et al., 2006), although individual values were in a broad range. In the piglets with average birth mass, mean values were somewhat below the reference range from the 7th day till weaning.

Table 5. Urea concentration in serum of two groups of suckling piglets

| Parameter | Piglets age | Piglets with low birth mass | | Piglets with average birth mass | |
|---|---|---|---|---|---|
| | | Median | Lower - upper quartile | Median | Lower - upper quartile |
| Urea (mmol/L) | 1st day | 5.25 | 2.88-10.07 | 4.54 | 2.95-5.90 |
| | 7th day | 3.89 | 2.84-4.97 | 2.76 | 2.29-3.16 |
| | 14th day | 3.68** | 2.94-5.00 | 3.11 | 1.12-1.99 |
| | 21st day | 3.83 | 2.88-4.46 | 3.17 | 2.59-4.01 |

** statistically significant difference according to the piglets with average birth mass (P<0.05)

During the observed period, the piglets with average birth mass had higher serum creatinine values (Table 6), and the differences at the age of 14 and 21 days were significant (P<0.05). That is in line with the fact that animals with larger muscle mass have higher creatinine concentration. In both groups, we observed significant higher creatinine concentration at weaning, with regard to the value determined after birth (P<0.01 in average and P<0.05 in low birth mass piglets), but the reference values (KANEKO et al., 2006) were not yet reached.

Table 6. Serum creatinine concentration in two groups of suckling piglets

| Parameter | Piglets age | Piglets with low birth mass | Piglets with average birth mass |
|---|---|---|---|
| | | Mean ± SD | Mean ± SD |
| Creatinine (μmol/L) | 1st day | 71.54 ± 20.75 | 71.88 ± 10.98 |
| | 7th day | 70.75 ± 13.90 | 77.36 ± 8.87 |
| | 14th day | 79.72** ± 10.18 | 87.14 ± 10.04 |
| | 21st day | 84.59**bb ± 11.86 | 94.28b ± 14.50 |

** statistically significant difference according to the piglets with average birth mass ($P<0.05$); [b]statistically significant difference according to the value at the 1st day of life within the group ($P<0.01$); [bb]statistically significant difference according to the value at the 1st day of life within the group ($P<0.05$)

Bilirubin concentrations were in very broad range in both groups during the whole preweaning period, but still within the limits of reference values (Table 7). In both groups of piglets we observed a continued decrease during the whole period causing statistically significantly lower value on the 21st compared to the 1st day of life ($P<0.01$).

Table 7. Bilirubin concentration in piglet serum during preweaning period

| Parameter | Piglets age | Piglets with low birth mass | | Piglets with average birth mass | |
|---|---|---|---|---|---|
| | | Median | Lower - upper quartile | Median | Lower - upper quartile |
| Bilirubin (μmol/L) | 1st day | 12.60 | 10.40-19.15 | 13.65 | 11.75-19.05 |
| | 7th day | 12.30 | 8.15-15.35 | 9.25 | 8.10-11.1 |
| | 14th day | 9.55 | 7.70-11.60 | 9.60 | 7.70-12.20 |
| | 21st day | 8.70b | 7.10-11.00 | 8.25b | 6.30-10.10 |

[b] statistically significant difference according to the value at the 1st day of life within the group ($P<0.01$)

## Discussion

Differences in growth capacity of low and average birth mass piglets observed in this study were in accordance with earlier research (EKERT KABALIN et al., 2008; EKERT KABALIN et al., 2012a), and with results of other authors (MILLIGAN et al., 2002; QUINIOU et al., 2002; GONDRET et al., 2005; REHFELDT and KUHN, 2006; FIX 2010; VÁCLAVKOVÁ et al., 2012; FERRARI et al., 2014).

Higher concentration of serum protein in the piglets with average birth mass during the first days of life can be explained with their more extensive synthesis, faster muscle growth and greater amount of resorbed cholostral proteins. It was already described that lighter piglets are considered to be physiologically more immature than heavier animals (DAVIS et al., 2000) and hence the albumin synthesis is weaker. SZYMECZKO et al. (2009) presented changes in the content of major proteins in piglets during the early postnatal period. Total serum protein level recorded in their research after 24 hours postpartum was 62.78 ± 1.14 g/L, and at 7th day it decrease significantly ($P<0.05$) to 52.78 ± 0.96 g/L. Contrary were recorded for albumin: from 9.39 ± 0.31 g/L in 24 hours old piglets concentration increase ($P<0.05$) to 19.99 ± 0.54 g/L on 7th day. In the research performed by EGELI et al. (1998) total protein value on the first day of life was 54 ± 12 g/L while in the 21-day-old piglets it amounts 52 ± 7 g/L. In their research, determined albumin values were lower on the 1st day of life (11 ± 2 g/L) than on the 21st day (32 ± 4 g/L). SVENDSEN et al. (1991) reported higher serum albumin values in the piglets with the birth mass above 1000 g: mean value in the mentioned group amounted to 35 g/L, and in the piglets below 1000 g it was 22 g/L. FRIENDSHIP et al. (1984) determined that the piglets at weaning had mean total protein value 56 ± 7 g/L from which 27 ± 5 g/L was albumin concentration. We assumed that higher serum protein concentration in the one-day-old piglets of both groups was the result of their increased absorption from colostrum (in accordance with EGELI et al. (1998) and EKERT KABALIN et al. (2008)). Although suckling piglets are capable of synthetizing albumin after birth, breakdown of mother's globulin is more emphasized, and synthesis of their own immunoglobulins starts around the third week. Since the suckling piglets with heavier birth mass are physically more mature, and they achieve immune competency faster, the synthesis also starts earlier. Hence, while in the group of low birth mass piglets, a continued decrease of serum total protein during whole period was observed, in the group of piglets with average body mass at birth it came to their mild growth after the 14th day. That was in agreement with DEVILLERS et al. (2011) who stated that piglets with lower birth mass had lower weight gain as well as plasma IgG and glucose concentrations. SZYMECZKO et al. (2009) found that total globulin concentration in serum of 24 hours old piglets amounted 53.39 ± 1.01 g/L, and significant decrease ($P<0.05$) on 7th day to 33.69 ± 0.78 g/L. The same authors also recorded significant decrease of total protein and some globulin fractions, as well as a steady increase of albumins during the consecutive periods of postnatal life. They stated that rapid increase in the content of protein and albumins in the blood of suckling piglets during the first 24 hours was caused by the absorption of "intact" colostrum proteins (especially maternal immunoglobulins) as well as by intensive liver synthesis of albumins strongly activated already in the first day of life.

Determined mean glucose values in both groups of piglets were within reference ranges for pigs (KANEKO et al., 2006) during the whole observed period, although individual values recorded in our study were in a broader range. Possible explanation for observed changes in serum glucose concentration during the suckling period is based on the fact that the newborn piglets are not fully metabolically developed, and significant amount of glucose is used as the energy source for thermoregulation. During the first week of life capability of warmth maintenance is starting to develop, the intake of nutritive elements is intensified with suckling and neonatal gluconeogenesis pathway is established. Mean glucose level in 24 hours old piglets included in research of SZYMECZKO et al. (2009) were 6.11 ± 0.32 mmol/L, with significant increase ($P<0.05$) recorded at 7$^{th}$ day of life (7.55 ± 0.19 mmol/L). EGELI et al. (1998) in one-day-old piglets recorded mean serum glucose concentration amounting to 5.0 ± 1.2 mmol/L, and in the age of 21 day 6.8 ± 0.6 mmol/L. FRIENDSHIP et al. (1984) determined that the piglets at weaning had mean serum glucose value of 5.4 ± 0.9 mmol/L. As we assumed on the basis of changes in glucose concentration, piglets physiologically and metabolically mature during the first weeks of life, and glycogenolytic and gluconeogenic pathways are fully established. That caused energy storing and muscle growth which again decreased the serum glucose level at the end of the suckling period.

Similar to changes of triacylglycerol concentration observed in our research, EGELI et al. (1998) also reported values within a broad range: in one-day-old piglets it ranging from 0.3 to 4.1 mmol/L, and in the 21-day-old piglets 0.4 - 2.5 mmol/L. Possible explanation for decrease in triacylglycerol concentration observed in this study may be in establishing of synthesis and storing fat which is very intensive during the first period of life, as well as the fact that their concentration in sows milk decrease with lactation.

HOLLANDERS et al. (1985) reported that low serum lipid concentration in the fetus increased after birth and colostrum indigestion, as well as cholesterol value (free and esterified). Increase in cholesterol concentration was also observed in this research. EGELI et al. (1998) reported mean serum cholesterol value of 1.9 ± 0.6 mmol/L in one-day-old piglets, and in 21-day-old piglets 3.8 ± 1.2 mmol/L. FRIENDSHIP et al. (1984) determined that the piglets at weaning had mean cholesterol value of 2.19 ± 0.52 mmol/L.

Higher urea concentration observed in the group of small piglets could be explained with the study of DAVIS et al. (2000) who found that newborn piglets had reserve capacity for metabolizing and extracting of nitrogen through urea, where the suckling piglets with lower body mass required more time for its processing. Similar, EGELI et al. (1998) reported mean serum urea concentration of 5.7 ± 2.4 mmol/L in one-day-old piglets, and 2.0 ± 1.0 mmol/L in 21-day-old piglets. In research of FRIENDSHIP et al. (1984) piglets at weaning had mean urea concentration of 5.3 ± 1.3 mmol/L.

In serum of newborn piglets we observed lower creatinine concentration compared to the reference values for pigs (KANEKO et al., 2006). Also, EGELI et al. (1998) in their research reported mean serum creatinine value of 70 ± 12 μmol/L in one-day-old piglets, and 87 ± 12 μmol/L on 21$^{st}$ day. FRIENDSHIP et al. (1984) determined that the piglets at weaning had mean creatinine concentration of 102 ± 22 μmol/L.

EGELI et al. (1998) stated in their study that zero was estimated as the lowest reference limit for the total bilirubin concentration in pigs sera. The same authors stated that high bilirubin level after birth can be explained with a shorter life of fetus erythrocytes and incomplete development of the liver which cannot fully metabolize products of metabolic degradation. Authors determined the following total bilirubin values: in the 1-day-old piglets' 6 ± 4 µmol/L, and in 21-day-old piglets 4 ± 2 µmol/L. FRIENDSHIP et al. (1984) determined that the piglets at weaning had mean bilirubin concentration of 2.0 ± 0.7 µmol/L. In our study a continued decrease was observed and great variability in bilirubine concentration - especially at the first day of piglets' life.

## Conclusions

Birth mass is one of the most significant endogenous factors that influence vitality of newborn piglets. In this research, we show changes in concentration of serum biochemical parameters during preweaning period in two groups of Yorkshire piglets (with low and average birth mass). Determined values showed higher variability in observed parameters than those that cover reference ranges for pigs. Some of differences between piglets of low and average birth mass may be attribute to the difference in their physiological maturity after birth and the first neonatal adaptation period.

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**SAŽETAK**

Najznačajniji gubitci u uzgoju svinja javljaju se tijekom razdoblja sisanja, osobito u odojaka porođajne mase manje od 1000 grama. Novoopraseni odojci nisu u potpunosti fiziološki zreli te se pojedini metabolički putovi postupno uspostavljaju tijekom najranijeg razdoblja života. Nadalje, velika količina energije koristi se za održavanje tjelesne temperature, a izgradnja kostiju, porast mišićne mase te sinteza masnog tkiva vrlo su intenzivni. Sve navedeno može utjecati na promjene u koncentraciji biokemijskih pokazatelja u serumu, od kojih pojedini odstupaju od referentnih vrijednosti danih u literaturi za odrasle svinje. U ovom radu promatrane su promjene u koncentracijama biokemijskih pokazatelja u serumu dviju skupina odojaka velikog jorkšira, tijekom razdoblja sisanja: jedna je skupina obuhvaćala odojke porođajne mase manje od 1000 g (mali odojci, n = 24), dok su u drugoj bili istospolni potomci iz promatranih legala čija je porođajna masa iznosila ≥1000 g (odojci prosječne porođajne mase, n = 24). Uzorci krvi za biokemijsku analizu uzimani su 1., 7., 14. i 21. dana života. U skupini odojaka male porođajne mase utvrđena je niža razina glukoze prvog dana života ($P<0,05$), kao i niža koncentracija kreatinina 14. i 21. dana ($P<0,05$). Također, koncentracije triacilglicerola i ureje bile su značajno veće ($P<0,05$) u lakših odojaka starih dva tjedna. Koncentracije ukupnih serumskih bjelančevina, globulina i kreatinina u obje su skupine pred odbiće bile još uvijek ispod referentnih vrijednosti za svinje, a koncentracija kolesterola viša. Stajališta smo da pojedine razlike između dviju promatranih skupina odojaka ukazuju na činjenicu kako porođajna masa može utjecati na fiziološku zrelost novorođenih jedinki.

**Ključne riječi:** odojci, razdoblje sisanja, porođajna masa, biokemijski pokazatelji, serum