

## BODY GROWTH OF GOAT KIDS IN ORGANIC FARMING

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The aim of this research was to determine the growth and development of goat kids from organic farming during the period of suckling and fattening. The research was conducted on organic farm with 15 goat kids French Alpine breed, during the suckling period (from kidding to 75 days) and the beginning of the fattening period (during the first 20<sup>th</sup> day of fattening). Goat kids were weighed at birth, 15, 45 and 75 days in the period of suckling, when weaning followed, and at the age of 95 days of fattening. Goat kids were fed a mixture of concentrated feed (50% barley, 30% corn, 10% wheat and 10% sunflower meal) and alfalfa hay *ad libitum*, while during the period of suckling. Goat kids were suckling *ad libitum*. Rearing and feeding of goat kids were in accordance with the Regulations on organic livestock production. Immediately after weighing goat kids were taken body measures (height of withers, trunk length, circumference and width of chest, circumference and leg length and cannon bone circumference), body condition scores and were calculated indices of anamorphosis and body proportions as well as daily gain. The determined body weight (from 4.39 kg to 15.72 kg) respectively, 18.82 kg) and daily gain (151 g or 155 g) of goat kids in suckling period and the beginning of the fattening period and indicate the satisfied result of feeding and rearing in the organic conditions. With increasing the age of goat kids body weight was growing, as well as daily gain and body condition scores (from 2.53 to 2.89), anamorphosis indices (from 45.00 to 61.87) and body proportions (from 16.71 to 32.96). Determined indicators of growth and development of goat kids show satisfactory rearing conditions in organic farming.

**Key words:** goat kids; body growth; organic farming

## ПРИРАСТ НА ЈАРИЊА ВО ОРГАНСКО ПРОИЗВОДСТВО

Целта на ова испитување беше да се одреди прирастот и развојот на јарињата во органско земјоделско производство, во периодот на доење и гоеење. Испитувањето беше спроведено на органска фарма кај 15 јариња од расата француска алпина за време на периодот на доење (од јарење до 75 дена) и на почетокот на периодот на гоеење (во текот на првите 20 дена на гоеење). Јарињата беа мерени при раѓање, на 15, на 45 и на 75 дена во периодот на доење, по кој следувааше одбивање, и на возраст од 95 дена во периодот на гоеење. Тие беа хранети со концентратна смеска (50% јачмен, 30% пченка, 10% пченица и 10% сончогледово кусте) и со луцеркино сено „по желба“ во текот на дојниот период. Јарињата цицаа исто така „по желба“. Одгледувањето и исхраната на јарињата беа во согласност со прописите за органско сточарско производство. Веднаш по мерењето на телесната маса, од јарињата беа земени повеќе мерки од телото: висина на грбот, должина на трупот, обем и ширина на градите, обем и должина на нозете и обем на лисната коска, извршена оценка на телесната кондиција, а беа пресметани и индексите на анаморфозност и телесните пропорции, како и дневниот прираст. Утврдените вредности на телесната маса (од 4,39 kg до 15,72 kg односно, 18,82 kg) и дневниот прираст (151 g или 155 g) на јарињата во текот на дојниот период и во почетокот на периодот на гоеење, покажуваат задоволителни резултати од исхрана и одгледување во органски услови. Со зголемување на возраста на јарињата, во пораст се телесната маса, дневниот прираст и оцената на телесната кондиција (2,53 до 2,89), индексот на анаморфозност (45,00 до 61,87) и пропорциите на телото (од 16,71 до 32,96). Утврдените индикатори на растот и развојот на јарињата покажуваат дека условите за одгледување при органско земјоделско производство се задоволителни.

**Клучни зборови:** јариња; телесен прираст; органско земјоделско производство

## INTRODUCTION

Although interest for organic livestock production is increasing, organic farming of domestic

animals is less frequent (Lu et al., 2010). Goats are with plenty of quality products (milk, meat, skin, hair) capable, with minimal inputs in production, reside in his environment without pollution, while

the production, contribute to the sustainable management of land and land clearing (Antunović et al., 2011). There are little relevant scientific and professional publications that deal with environmental issues of goat kids in organic farming (Zurita et al., 2009; Antunović et al., 2007 and 2013). Most of the research are aimed toward testing the productivity of goats in organic farming (Antunović et al., 2006 and 2007; Kompan and Kastelic, 2008; Rahman, 2009; Miotello et al., 2009; Tudisco et al., 2010). Suckling young goat kids are very sensitive category of animals that may be affected by various disorders and undeveloped growth because in the early life they are nonresistant due to the underdevelopment of certain organs and biological mechanisms, and thus their non-functional in the real sense (Antunović et al., 2008). The goat kids are especially sensitive on the changes in nutrition and rearing. When feeding goat kids with low quality diets, retarded growth and development may occur, which is later very difficult to compensate with correction of feeding (Pavić et al., 2005).

The aim of this study was to determine growth and development of goat kids in organic farming during suckling and fattening period.

## MATERIALS AND METHODS

The study was conducted on certified organic family farm located in Eastern Slavonia (northwest, approximately 30 km from Osijek) with 15 goat kids of French Alpine breed during the suckling period (from kidding to 75<sup>th</sup> day) and the beginning of the fattening period (during the first 20 days of fattening). Goat kids are selected from litters where they were single, and goats were in 4<sup>th</sup> lactation. Goat kids were weighed and measured at birth, 15<sup>th</sup>, 45<sup>th</sup> and 75<sup>th</sup> day in the suckling period, when weaning occurred, and at the age of 95<sup>th</sup> day of fattening. In the suckling period goat kids were suckling mothers and fed with mixture of concentrated feed (50% barley, 30% corn, 10% wheat and 10% sunflower meal) as well as alfalfa hay *ad libitum*. After weaning goat kids were fed only with the same concentrate mixture and alfalfa hay *ad libitum*. Rearing and feeding of goat kids were in accordance with the Regulations of organic livestock production (2002). Immediately after weighing body measurements (height of withers, trunk length, circumference and width of chest, circum-

ference and leg length and cannon bone circumference) were taken from kids, and then average daily gain was calculated. Body condition score of kids were assessed according to Santucci and Maestrini (1985) with grades from 1 to 5, and indices of anamorphosis as well as body proportions were calculated according to Chiofalo et al. (2004).

The research results were analyzed in the computer program Statistica (2008) and expressed as arithmetic mean (mean) and standard deviation (sd).

## RESULTS AND DISCUSSION

In Tables 1 and 2 production characteristics and exterior measures of goat kids in organic farming are present.

By analysis of Tables 1 and 2 it is shown that the goat kids developed and gained faster in the suckling period compared to the beginning of fattening. This was expected because the goat kids in the beginning of fattening were in unfavorable situation, due to changes in diet, although they were adapted to the specified diet during suckling period too. During weaning period of goat kids, reduced feed intake and conversion may occur (Toukourou and Peters, 1999). Therefore, the appropriate protein intake from solid feed is important for successful weaning of goat kids (Greedwood, 1993). The highest daily gain of goat kids was achieved in the suckling period from 1 to 15 days and from 1 to 45 days (175.29 and 175.07 g, respectively). The similar conclusions in conventional conditions in the Alpine breed goats determined Vnučec et al. (2005), but the goat kids' achieved gains in the period from 1<sup>st</sup> to 19<sup>th</sup> day were significantly higher (220.76 g). Bartocci et al. (1986) present that the largest increment of goat kids occurs in the first month of life and later is falling.

With increasing of goat kids age, growing weight increased, as well as daily gain and body condition scores (of 2.53 to 2.89), indices of anamorphosis (from 45.00 to 61.87) and indices of body proportions (from 16.71 to 32.96), that are shown in Table 3. Identified indicators of growth and development of goat kids show satisfactory rearing conditions in organic farming. Although with good quality feeding, much better production effects in goat kids may be accomplished.

Table 1

*The production characteristics of goat kids in organic farming (mean ± sd)*

Time of measuring (day)	Birth	15 <sup>th</sup>	45 <sup>th</sup>	75 <sup>th</sup>	95 <sup>th</sup>
Body weight, kg	4.39 ± 0.91	7.02 ± 1.15	12.27 ± 2.55	15.72 ± 2.28	18.82 ± 2.13
Time of measuring (day)	from 1 <sup>st</sup> to 15 <sup>th</sup>	from 1 <sup>st</sup> to 45 <sup>th</sup>	from 1 <sup>st</sup> to 75 <sup>th</sup>	from 75 <sup>th</sup> to 95 <sup>th</sup>	from 1 <sup>st</sup> to 95 <sup>th</sup>
Daily gain, g	175.29 ± 72.44	175.07 ± 53.03	151.08 ± 24.75	155.07 ± 66.15	151.92 ± 15.87

sd – standard deviation

Table 2

*Exterior measures of goat kids in organic farming (mean ± sd)*

Body measure, cm	Time of measuring (day)			
	15 <sup>th</sup>	45 <sup>th</sup>	75 <sup>th</sup>	95 <sup>th</sup>
Height of withers	41.97 ± 3.24	47.07 ± 5.03	51.80 ± 2.98	57.03 ± 2.83
Trunk length	40.51 ± 3.56	48.77 ± 4.52	53.57 ± 4.18	58.96 ± 3.31
Circumference of chest	43.33 ± 2.80	51.80 ± 4.12	55.50 ± 3.81	59.37 ± 3.00
Width of chest	7.90 ± 0.71	9.83 ± 1.82	9.93 ± 0.78	10.20 ± 1.08
Leg length	16.37 ± 0.61	18.63 ± 0.90	21.53 ± 2.77	23.27 ± 3.04
Circumference of leg	20.93 ± 3.29	24.70 ± 1.93	28.83 ± 2.62	26.07 ± 2.02
Cannon bone circumference	7.00 ± 0.53	7.47 ± 0.64	7.52 ± 0.61	7.63 ± 0.55

sd – standard deviation

Table 3

*Indices of physical development of goat kids in organic farming (mean ± sd)*

Index	Time of measuring (days)			
	15 <sup>th</sup>	45 <sup>th</sup>	75 <sup>th</sup>	95 <sup>th</sup>
Body condition scores	2.53 ± 0.58	2.67 ± 0.37	2.75 ± 0.45	2.89 ± 0.27
Anamorphosis index	45.00 ± 5.52	57.24 ± 5.42	59.71 ± 7.43	61.87 ± 4.39
Body proportion index	16.71 ± 2.43	25.91 ± 3.71	30.28 ± 3.48	32.96 ± 2.76

sd – standard deviation

Antunović et al. (2006, 2007 and 2013) determined similar birth weight of goat kids in organic farming. In studies of the same authors (Antunović et al., 2012) slightly lower birth weight of goat kids were found, compared with this research. Pavić et al. (1988) in conventional breeding of goat kids determined similar birth weight of kids Alpina (4.11 kg) and average daily gain (149.7 g) in the period of kidding to the 102<sup>nd</sup> day of life. However, Mioč (1988) and Majid et al. (1993) determined lower birth weight of Alpine kids (3.55 kg and 3.8 kg). In the study by Mioč et al. (2011) that was conducted with goat kids of Croatian Spotted breed, lower birth weight (2.28 kg), lower weight

at weaning (186 days 23 kg) and average daily gain (115.43 g) of goat kids were determined. In the study by Marquez et al. (2007), lower birth weight and weaning weight at the age of 60 days in the goat kids of Alpine breed (2.11 and 13.20 kg) were recorded, as well as slightly higher daily gain of kids until weaning (186 g). The above is in accordance with the conclusions by Leas-Fattback and Peters (1995) that highlight a significant variations birth weight of goat kids that depend on the influence of breed, nutrition and season. In the goat kids from organic farming at the age of 70<sup>th</sup> to 110<sup>th</sup> day in the research by Antunovic et al. (2008) similar weight and average daily gain (15.93 and

21,54 kg and 140.27 g) were determined, as well as determined body measures and indices of physical development.

## CONCLUSION

Based on conducted research we can conclude that the body growth of goat kids in organic farming was satisfactory, although the results may be improved by high quality feeding and thus provide efficient production.

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