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Growth performance and carcass traits of Croatian multicoloured breed kids

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ABSTRACT

The Croatian multicoloured goat is an autochthonous breed that belongs to a group of extensive Mediterranean breeds and represents the most of Croatian goat population. The aim of this paper was to evaluate growth potential, carcass traits and composition of male (36) and female (54) Croatian multicoloured breed kids. Kids were raised traditionally, on rangeland pasture from birth up to 24 kg live weight together with their mothers. Average birth weight of kids was 2.3 kg, daily gain 112 g, hot carcass weight 11.6 kg and dressing value 48.2%. Average percentage contribution to live weight of intestines was 31.5%, lungs and hearth 1.99%, liver 1.86%, spleen 0.28%, testicles 0.78%, skin and feet 9.25% and horns 0.48%. Daily gain, dressing value, percentage contribution of some organs (spleen, skin and feet, horns) to live weight, were significantly affected by gender. Male goat kids had significantly longer hind limb and deeper chest than female kids. Despite their relatively high average age at slaughter and low growth rates, Croatian multicoloured goat kids had satisfactory dressing percentage and carcass characteristics.
(Keywords: growth performance, goat kid, carcass composition, carcass measurements, sex)

INTRODUCTION

The Croatian multicoloured goat is a very important kid meat producing animal in Croatia. It is an autochthonous breed that represents about 75% of the total goat population (*HPA,* 2009). The main breeding area of Croatian multicoloured goat are the coastal areas (Velebit and Dinara mountains, Dalmatian hinterland) where there is a lot of rocky ground and stone, poor vegetation, thicket and underbrush, and there are very few possibilities of breeding other types of stock (except sheep), especially larger stock. The body of mature Croatian multicoloured goats is medium sized (from 37 to 50 kg) and overgrown with thick, lengthy and dense hair of a black-white, brown or grey-white colour and rarely of a single colour. The head is medium sized, with obligatory horns mostly curving backwards, shaped like a sabre (*Mioč et al.,* 2008). It has not been registered that this breed was significantly and systematically improved in any period, except some sporadic attempts. Hence, we can acknowledge that it was originally created in this area and that it belongs to a group of extensive Mediterranean breeds (*Rako et al.,* 1979).

The main breeding goal of Croatian multicoloured breed is kid meat production, while milk secretion lasts until weaning or slaughtering of offspring. Despite its importance, Croatian multicoloured goat has received little attention. Also, to our knowledge, there is no published information relating to the previously mentioned goat

breed kids' growth and carcass traits. The objective of the present study was to establish growth performance, carcass traits and composition of male and female Croatian multicoloured breed kids.

MATERIALS AND METHODS

A total of 90 single born Croatian multicoloured breed kids (36 males and 54 females) were used for this experiment. Kids were raised traditionally, on rangeland pasture from birth up to 24 kg live weight together with their mothers. In order to get accurate records for birth weights, all investigated kids were weighed within 12 hours of birth. Kids were weighed and slaughtered after an overnight fast at a local slaughterhouse. Daily gain of kids was calculated as a difference between slaughter weight and birth weight, divided by days of age at slaughter. The dressed carcass comprised body after removing the skin, fore feet (at the carpal-metacarpal joint), hind feet (at the tarsal-metatarsal joint), and the viscera. Kidneys, kidney and pelvic fat were retained in carcass, and testes and scrotal fat were also removed (according *Colomer-Rocher et al.,* 1987). Hot carcass weight and weights of the skin and feet and some visceral organs (heart, lungs plus trachea, liver, spleen) were recorded. The gastro-intestinal tract was weighed full. The results were expressed as percentage of live weight at slaughter. Dressing percentage was calculated based on full live weight. Carcass measurements included, carcass length: from the caudal edge of the last sacral vertebra to the dorso-cranial edge of the atlas vertebra; hind leg length: from the centre of the tuberosity on the proximal end of the tibia to the distal edge of the tarsus; chest depth: the greatest depth, measured in a horizontal plane on the hanging carcass; width of buttock: the greatest width, measured in a horizontal plane on the hanging carcass (*Fisher and de Boer,* 1994) and chest width: the greatest width, measured with callipers in a horizontal plane on the hanging carcass. Data were analyzed by using MEANS procedure, and variance analysis was performed using the GLM procedure (*SAS,* 1999) by using the model which included fixed effect of sex and random residual error. Least square means were computed and tested for differences by the Tukey-Kramer test.

RESULTS AND DISCUSSION

Mean birth weight of kids in our research was similar to earlier study on Croatian multicoloured breed (*Babić,* 1940). The birth weight of a kid depends primarily on the conformation and size of the adults of the breed to which it belongs (*Morand-Fehr,* 1981). Thus, Croatian multicoloured breed kids (*Table 1*) had considerably lower mean birth weight than some European dairy breed kids (*Majid et al.,* 1993), like Saanen and Toggenburg kids (3.8 and 3.5 kg, respectively).

Also, mature size of the sire and dam is one of the major influences of kids' growth. Hence, average growth rate of 112 g/day in the present study was lower than average growth rates attained for Saanen crossbred kids of similar age (140–167 g/day) in a study by *Dhanda et al.* (2003). Despite relatively low average daily gain, Croatian multicoloured kids were heavier than weaned kids of larger breeds at the same age, such as Anglo-Nubian and Saanen (*Dickson et al.,* 1990). This is in accordance with results of the previous studies, which demonstrated that greater growth rates of goat kids in the pre-weaning period are followed by a post-weaning depression of growth rates (*Palma and Galina,* 1995).

In the present study, kids' dressing percentage (48.2%) was higher than compared to Boer crossbred goats and Canary Caprine Group breed of similar live weight at slaughter (*Ryan et al.,* 2007; *Marichal et al.,* 2003). According to the data presented in *Table 1*, average percentage contribution to live weight of intestines was 31.5%, lungs and hearth 1.99%, liver 1.86%, spleen 0.28%, testicles 0.78%, skin and feet 9.25% and horns 0.48%.

Table 1

Descriptive statistics for slaughter data of Croatian multicoloured-breed kids

	$\overline{x}$	Sd	$S_{\overline{x}}$	min	max	CV, %
Birth weight (kg)	2.3	0.64	0.07	1.0	3.5	27.8
Daily gain (g)	112.0	27.0	2.7	73.0	241.0	24.1
Age (d)	189.3	32.2	3.3	103.0	315.0	17.0
Live weight (kg)	24.1	3.1	0.3	18.0	33.5	12.8
Hot carcass weight (kg)	11.6	1.5	0.2	8.2	16.6	13.1
Dressing percentage (%)	48,2	2,2	0,23	40,6	52,5	4.5
Intestines (kg)	7.6	1.2	0.1	5.5	10.9	15.5
Lungs and heart (g)	480.0	88.6	9.3	301.0	795.0	18.5
Liver (g)	449.5	62.8	6.6	310.0	658.0	14.0
Spleen (g)	68.6	19.3	2.06	34.0	114.0	28.2
Testicles (g)	189.1	66.4	11.3	63.0	327.0	35.1
Skin and feet (kg)	2.23	0.26	0.03	1.73	2.93	11.9
Horns (g)	116.7	52.2	7.1	42.0	236.0	44.7

Carcass measurements of Croatian multicoloured kids are presented in *Table 2*. *Ekiz et al.* (2010) reported significant influence of breed on carcass measurements. *Dhanda et al.* (1999) reported higher length for larger size genotypes (e.g. Boer or Saanen crosses) compared to Angora or Feral crosses. In comparison with kids in our study, Turkish Saanen suckling kids with average slaughter weight of 13.3 kg, had higher hind limb length and buttock width (28.35 and 13.43 cm, respectively).

Table 2

Descriptive statistics for carcass measurements (cm)

Carcass measurements	$\overline{x}$	Sd	$S_{\overline{x}}$	min	max	CV, %
Carcass length	61.17	3.14	0.33	52.00	67.50	5.13
Hind limb length	25.02	1.17	0.12	20.60	27.50	4.68
Chest depth	23.72	1.10	0.11	21.50	26.50	4.64
Chest width	11.51	0.72	0.07	9.80	13.50	6.29
Buttock width	12.95	1.37	0.15	10.80	23.80	10.58

Birth weights did not differ between sexes (*Table 3*), which is not in agreement with results of *Morand-Fehr* (1981) who reported significantly higher birth weights of male kids compared to females for several goat breeds.

Table 3

Least square means (±SE) of male and female kids' performance, carcass traits and non-carcass components

Traits	Male (n=36)	Female (n=54)	P value
Birth weight (kg)	2.33 ± 0.09	2.25 ± 0.09	0.56
Daily gain (g)	121.7 ± 0.01	110.4 ± 0.01	<0.05
Age (d)	184.9 ± 4.8	193.9 ± 4.6	0.17
Live weight (kg)	24.8 ± 0.5	23.7 ± 0.4	0.08
Hot carcass weight (kg)	11.8 ± 0.3	11.5 ± 0.2	0.49
Dressing percentage (%)	47.3 ± 0.3	48.8 ± 0.3	<0.01
Intestines (%)	31.9 ± 0.6	31.3 ± 0.5	0.39
Lungs and heart (%)	2.01 ± 0.05	1.98 ± 0.04	0.65
Liver (%)	1.85 ± 0.04	1.89 ± 0.03	0.46
Spleen (%)	0.26 ± 0.01	0.30 ± 0.01	<0.01
Skin and feet (%)	9.7 ± 0.2	9.1 ± 0.2	<0.05
Horns (%)	0.66 ± 0.02	0.32 ± 0.02	<0.001

According to other studies (*Singh et al.,* 2009), male Croatian multicoloured kids had higher average daily gain (P<0.05) and higher live weight at slaughter (P<0.08) than female kids (*Table 3*). Furthermore, male kids had significantly (P<0.01) lower dressing value than females. Similarly, *Živković and Knežević* (1991) reported lower dressing percentage in male kids from Croatian multicoloured×Alpine crossbred genotypes compared to females, although the difference was not significant. Significant difference between sexes in our study for dressing percentage based on live weight was mainly attributed to the variations in the weight of spleen, skin and feet and horns at slaughter. However, it was difficult to make comparisons with most of the literature because of the different genotypes, rearing systems, age and slaughter weight, etc. used.

Male goat kids had longer hind limb (P<0.05) and deeper chest (P<0.01) than female kids (*Table 4*), which may be due to higher live weight of male kids at slaughter. On the contrary, *Santos et al.* (2007) and *Peña et al.* (2007) found significant difference between sexes only for carcass length in Serrana and Florida kids, respectively. However, *Peña et al.* (2007) reported an increase in carcass measurements with increasing slaughter weight.

Table 4

Least square means (±SE) of male and female kids' carcass measurements (cm)

Carcass measurements	Male (n=36)	Female (n=54)	P value
Carcass length	61.63 ± 0.52	60.87 ± 0.43	0.26
Hind limb length	25.38 ± 0.19	24.78 ± 0.15	<0.05
Chest depth	24.14 ± 0.18	23.44 ± 0.14	<0.01
Chest width	11.49 ± 0.12	11.52 ± 0.10	0.84
Buttock width	13.18 ± 0.23	12.80 ± 0.19	0.20

CONCLUSIONS

This initial study provides the basis for estimating non-genetic effects of sources of variation of growth performance and carcass traits and allows a well-documented evaluation of this indigenous Croatian goat breed not yet selected. Despite their relatively high average age at slaughter and low growth rates, Croatian multicoloured goat kids had satisfactory dressing percentage and carcass characteristics. In order to accomplish better economic efficiency of this breed in existent production system, further researches on evaluation of meat production potential of this breed under controlled management are necessary.

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