Some carcass traits of Balkan goat and kid meat of its crosses

Milevska, E[1]., M. Stojanovski[1], N. Kozarovski[1], D. Kitanovski[1]

Scientific paper

Summary

The aim of this research was to determine how breed influences growth intensity and carcass traits of kid meat.
All male kids (from domestic Balkan breed and F_1 crosses between domestic Balkan breed and Alpine breed) were fed and kept in the same conditions. After the slaughter, measurements of each carcass were made. The results show significant differences in birth weight of domestic Balkan breed (3.24 kg) and F_1 crosses between domestic Balkan breed and Alpine breed (2.67 kg). Carcass yield was found lower (51.94%) with pH_1 6.56 and pH_2 5.90 in domestic Balkan kids compared to Alpine kids (57.61%) with pH between 6.40 and 5.76. Average tissue shares for Balkan breed were as follows: muscle tissue 49.46 %, fat tissue 17.35% and bones 33.19% in domestic Balkan kids. Muscle tissue from F_1 crosses between domestic Balkan breed and Alpine breed was 55.57%, fat tissue 18.19% and bones 26.54%
***Key words**: goat, birth weight, carcass yield, meat tissue*

Introduction

Kid meat lately occupies an important place in the diet of the population, due to its high biological value. The interest in the production of meat comes from expressed fertility of goats. In the Republic of Macedonia the dominant goat breed is domestic Balkan goat (80%). There is also a large number of strains of Balkan goats, crossbreed with different breeds. During the last decade Balkan goat breed was meliorated with the Alpine and Saanen goat breed for the improvement of milk production and fertility traits. In most European countries goats of small body mass (9-14 kg) are slaughtered and are considered a specialty which achieves a high price. Young kid meat has certain advantages over other types of meat, especially in a small amount of fat and high digestibility (Mioč, 1998).

The research suggests that goat production, especially goat meat, could be very lucrative due to its market demand, which in most European countries, as well as in the U.S. (Glimp et al.,1986), Canada (Bishop, 1991), Mexico (Mercado et al., 1991) exceeds the offer. The development of goat breeding is moving in the direction of increasing milk and meat production over the growing number of kids in the brood. Due to the fact that kids are mainly used for meat production, the objective of this research was to study qualitative and quantitative characteristics of domestic Balkan goat meat and meat from F_1 crosses.

Material and methods

Researches were conducted in villages in the municipality of Bitola in the Republic of Macedonia in different herds of private goat breeders.

We conducted our research on 12 male kids from domestic Balkan goats and 12 male kids from F_1 hybrid crosses between domestic Balkan breed and Alpine breed, of average age of 114 days, placed under the same conditions, care and nutrition. The diet for kids through the tested period was suckling and pasture. The growth of kids was followed by the individual weighing (precision 0.05 kg) every 10 days from birth to the slaughter. Slaughter was performed with classical method: stunning, bleeding, separation of the skin and the lower parts of feet, extracting intestines. Immediately after the slaughter, individual organs were weighted (the stomach and intestines, liver, heart) skin, feet, horns, and the rest. Carcasses were cut into sides along the spine according to Rulebook on quality of meat from slaughter livestock, poultry and wild game, Official Journal of R.M, No. 29/74. Rib cuts from the 9th to the 11th rib were separated from the left side, and dissected in order to separate tissues: muscle, fat and bone. The pH was evaluated immediately after slaughter (pH_1) and 24h (pH_2) postmortem in the MLD *(Musculus longissimus dorsii)* between the 13th and the 14th rib, using a pH meter equipped with a penetrating electrode and thermometer, model ''testo'' 205.

The obtained data was processed according to LSMLMW method (Harvey,1990). The statistical significance of the effect considered was evaluated by means of the variance analysis at the level p-0.05 and p-0.01. The variations between each mean value were also tested by applying the T-test.

[1] **Elena Milevska, Mitre Stojanovski, Nikola Kozarovski, Dimce Kitanovski,** Faculty of Biotechnical sciences, Partizanska b.b. Bitola, Macedonia (milevskaelena445@yahoo.com)

Table1 Kids' birth weight, kg
Tablica 1. Porodna težina jaradi, kg

Values Vrijednosti	Kids from F_1 crosses between domestic Balkan breed and Alpine breed Jarad F_1 križanaca domaće balkanske pasmine i alpske pasmine	Kids from Balkan goats Jarad balkanskih koza
N	12	12
$\bar{x}$	3.24[a]	2.67[b]
S_d	0.46	0.67
$S\bar{x}$	0.13	0.21
Min	2.50	1.80
Max	3.80	3.60
Cv	14.04	25.77

Means with different letters differ significantly : P<0,05= a,b,
Srednje vrijednosti označene različitim slovom značajno se razlikuju: P<0,05= a,b,

Table 2 Body weight (kg) and kids' growth (kg)
Tablica 2. Tjelesna težina (kg) i rast jaradi (kg)

Values Vrijednosti	$\bar{x}$	S_d	$S\bar{x}$	min	max	cv
Kids from F_1 hybrid crosses between domestic Balkan breed and Alpine breed Jarad F_1 križanaca domaće balkanske pasmine i alpske pasmine						
Body weight Tjelesna težina	15.97[a]	2.55	0.74	12.00	21.80	15.94
Overall growth Sveukupni rast	12.75	2.51	0.73	8.70	18.10	19.69
Daily gain Dnevni prirast	118.84[a]	3,07	1.04	70.76	130.85	20.01
Kids from domestic Balkan goats Jarad domaćih balkanskih koza						
Body weight Tjelesna težina	10.84[b]	1.72	0.54	8.80	14.90	15.86
Overall growth Sveukupni rast	8.17	1.75	0.55	7.30	11.70	21.42
Daily gain Dnevni prirast	71.70[b]	1.81	0.62	40.76	90.76	15.32

Means with different letters, differ significantly : P<0.001= a,b,
Srednje vrijednosti označene različitim slovom značajno se razlikuju: P<0,001= a,b,

Results and discussion

Birth weight of kids from domestic Balkan goats and F_1 crosses are shown in Table 1.

Data in Table 1 indicate that there are significant differences (p<0.05) in birth weight of F_1 hybrid and the main reason is the influence of breed on birth weight. Kids with larger body mass and daily gain prior to slaughter (Table 2.) produce carcasses with a higher relative share (p<0.001) of traits of meat quality. Žujović *et al.*(1983) investigated the effect of body mass (10, 15 and 24 kg) prior to slaughter on meat yield of kids of Domestic White Improved breed and established that lighter kids had higher dressing percentage. Morand – Fehr *et al.* (1985) established that in carcasses of kids of Alpine and Saanen breed, slaughtered at higher body mass (8, 10, 12, 14, 18 and 24 kg) the quantity of fat tissue increased. Yacoub *et al.* (1987) established that body mass of kids prior to slaughter has considerable effect on value of dressing percentage. Žujović *et al.* (2001) investigated the effect of body mass of kids prior to slaughtering on major traits of meat quality. Žujović *et al.* (2006) stated that heavier kids have more favorable evaluation of carcass conformation, covering of carcass and kidneys with fat, colour of meat and tallow, and marbling of meat, whereas the structure of meat was better in lighter kids.

The share of edible giblets/offal (pre-stomach, small intestines, head, heart) (Table 3.) was significantly lower (p<0.01) in group of F_1 hybrid compared to the group of kids from domestic Balkan goat. The share of skin was practically the same in all groups of kids.

Yield is quite variable and depends on two groups of factors: pre- slaughter factors (body weight, breed, diet, the age in time of slaughter, sex, health status) and factors which affect after slaughter (technological processing of slaughter and cooling). The results of this research indicate that heavy kids (average body mass prior to slaughter 15.97 kg) realize the best meat yield, i.e. higher dressing percentage of cooled carcass (57.61%) compared to light (average body mass prior to slaughter 10.84 kg) whose dressing percentage was slightly (P > 0.05) lower 51.94%.

According to available publications, the obtained results for val-

ues of weight of the warm and cold carcass with and without the head and offal and values of dressing percentages that are established for kids of Domestic balkan goat and Alpine are at the same level as the ones established by researches of Becerril-Herrera *et al.*,(2006),for kids of Mexican Creole goat; Marichal *et al.*, (2003), for values of dressing percentages for kids slaughtered at different body weights (from 6 to 15 kg) and Kor and Ertugrul (2000) investigating slaugther results and meat quality for kids of Akkeci goat breed. Similar values of cold dressing percentages (without the head and offal) for male kids are at the level of ones which were found during this investigation (55,23%), Daskiran et al., (2006) have obtained in their researches, investigating slaughter results for male kids of local Norduz goat breed which is actually distributed in region Van Province - Turqey, in either intensive (51.49%) or pasture conditions (54.63%). The mean pH_1 values of meat from both breeds (6.40-6.56) and pH_2 (5.76-5.90) were considered optimal for high-quality goat meat (Dhanda et al.,2003).

The share of fat tissue (peritoneum and kidney fat) and muscle tissue (Table 4) was higher in F_1 hybrids compared to kids of domestic Balkan breed. These differences indicate that breed has an impact on the tissue composition of kid meat, because it is statistically significant ($p < 0.01$).

Conclusion

Breed and body mass of kids prior to slaughter significantly influenced the quality of kids' carcasses and the quality of their meat. Kids of F_1 hybrid have more favorable carcass evaluation, covering of carcass and kidneys with fat tissue and lower share of giblets/offal (head, liver, heart) in cooled carcass in relation to kids from Domestic Balkan goat.

In terms of meat quality, that was usual, significant differences ($p<0.01$) were determined between the analyzed groups of kids. Considering that medium heavy kids (average body mass prior to slaughter 15.97 kg) had more favorable commercial value of carcass, kids bellow 15.00 kg should not be slaughtered.

Table3 Slaughter indicators of kids
Tablica 3. Indikatori pri klanju jaradi

Values Vrijednosti	Kids crosses between domestic Balkan breed and Alpine breed from F_1 hybrid Križanci jaradi domaće balkanske pasmine i alpske pasmine od F_1 hibrida		Kids from Balkan goats Jarad balkanskih koza	
	kg	%	kg	%
Body weight at slaughter Tjelesna težina pri klanju	15.97	100.00	10.84	100.00
Hot carcass weight with internal organs (RI) Težina toplih polovica s unutarnjim organima (RI)	9.43	59.78 [a]	5.78	53.55 [b]
Cold carcass weight with internal organs (RII) Težina hladnih polovica s unutarnjim organima (RII)	9.11	57.61 [a]	5.61	51.94 [b]
Stomach and intestines Trbuh i crijeva	3.36	21.42	2.60	24.45
Feet Noge	0.50	3.18	0.41	3.83
Skin Koža	1.40	8.92	1.00	9.33
Head Glava	0.76	4.92	0.64	6.00
Heart Srce	0.10	0.65	0.05	0.51
Liver Jetra	0.53	3.34	0.31	2.91
pH values pH vrijednosti	pH_1 6.40	pH_2 5.76	pH_1 6.56	pH_2 5.90

Means with different letters, differ significantly : P<0.05= a,b,
Srednje vrijednosti označene različitim slovom značajno se razlikuju: P>0.05 = a,b,

Table 4 Share and ratio of tissues in three rib cut of kids
Tablica 4. Udio i omjer tkiva u trorebarnom isječku jaradi

Breeds Pasmine	Muscle tissue (%) Mišićno tkivo (%)	Bone tissue (%) Koštano tkivo (%)	Fat tissue (%) Masno tkivo (%)
Kids from F_1 hybrid Jarad F_1 križanaca	55.27 [a]	26.54	18.19 [a]
Kids of domestic Balkan breed Jarad domaće balkanske pasmine	49.46 [b]	33.19	17.35 [b]

Means with different letters, differ significantly : P<0.01= a,b,
Srednje vrijednosti označene različitim slovom značajno se razlikuju: P<0,01= a,b,

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Neke karakteristike mesa Balkanske koze i jarića

Sažetak

Svrha ovog istraživanja je bila utvrditi način na koji pasmina utječe na intenzitet rasta i karakteristike jarećeg mesa.
Svi muški jarići (domaće Balkanske pasmine i F_1 križanaca domaće Balkanske pasmine i Alpske pasmine) su hranjeni i održavani u istim uvjetima. Nakon klanja su izvršena pojedinačna mjerenja mesa. Rezultati pokazuju značajne razlike pri porodnoj težini domaće Balkanske pasmine (3,24 kg) i F_1 križanaca domaće Balkanske pasmine i Alpske pasmine (2,67 kg). Utvrđen je manji prinos mesa (51, 94%) sa pH_1 6,56 i pH_2 5,90 kod domaćih Balkanskih jarića u usporedbi s Alpskim jarićima (57,61%) i pH vrijednostima u rasponu od 6,40 i 5,76. Postotak mišićnog tkiva kod domaćih Balkanskih jarića je iznosio 49,46 %, masnog tkiva 17,35% i kostiju 33,19%. Kod F_1 križanaca domaće Balkanske pasmine i Alpske pasmine je mišićno tkivo iznosilo 55,57%, masno tkivo 18,19%, te kosti 26,54%.
Ključne riječi: *koza, porodna težina, prinos mesa, mišićno tkivo*

Einige Charakteristiken des Ziegenfleisches

Zusammenfassung

Das Ziel dieser Untersuchung war zu bestimmen, auf welche Weise die Rasse auf Intensität des Wuchses und Charakteristiken von Ziegenfleisch einen Einfluss hat. Alle männlichen Ziegenböcke (einheimische balkanische Rasse und F_1 Mischlinge der einheimischen balkanischen Rasse und der Alpenrasse) wurden in gleichen Bedingungen gehalten und gefüttert. Nach dem Schlachten sind einzelne Fleischmessungen vorgenommen. Die Resultate zeigen bedeutende Unterschiede bei Geburtengewicht der einheimischen balkanischen Rasse (3,24 kg) und der F_1 Mischlinge der einheimischen balkanischen Rasse und der Alpenrasse (2,67 kg). Es wurde ein größerer Fleischertrag (51,94 %) mit pH_1 6,56 und pH_2 5,90 bei einheimischen balkanischen Ziegen im Vergleich zu Alpenzigen (57,61 %) mit Werten pH_1 6,40 und pH_2 5,76 festgestellt. Der Prozentsatz des Muskelgewebes bei einheimischen balkanischen Ziegen betrug 49,46 %, des Fettgewebes 17,35 %, der Knochen 33,19 %. Bei den F_1 Mischlingen der einheimischen balkanischen Rasse und der Alpenrasse betrug der Prozentsatz des Muskelgewebes 55,57 %, des Fettgewebes 18,19 %, der Knochen 26,54 %.
Schlüsselwörter: *Ziegenböcke, Geburtengewicht, Fleischertrag, Muskelgewebe*

Alcune caratteristiche della carne di capra Balcanica e i suoi capretti

Sommario

Lo scopo di questa ricerca era trovare il modo in cui la razza influisce sull'intensità di crescita e sulle caratteristiche della carne di capretti. Tutti i capretti maschi (di domestica Razza balcanica e degli incroci F1 di domestica Razza balcanica e la Razza alpina) sono stati allevati e mantenuti nelle stesse condizioni. Dopo la macellazione sono state fatte le misurazioni individuali di carne. I risultati dimostrano le differenze notevoli tra il peso alla nascita della domestica Razza balcanica (3,24 kg) e degli incroci F1 di domestica Razza balcanica e la Razza alpina (2,67 kg). Risulta un rendimento minore di carne
51, 94%) con il pH1 6,56 e il pH2 5,90 dai capretti domestici di Razza balcanica rispetto ai capretti di Razza alpina (57,61%) e i valori pH nel raggio da 6,40 e 5,76. La percentuale del tessuto muscolare dai capretti domestici di Razza balcanica era 49,46 %, la percentuale del tessuto grasso 17,35% e delle ossa 33,19%. Dagli incroci F1 di domestica Razza balcanica e la Razza alpina il tessuto muscolare era 55,57%, il tessuto grasso 18,19 e le ossa 26,54%.
Parole chiave: *capretti, peso alla nascita, produzione di carne, tessuto muscolare*