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The growth rate and carcass quality of lambs of Zelaznenska sheep reared in different maintenance conditions[1]

E. Kuznicka, W. Rant and A. Radzik-Rant
Warsaw Agricultural University, Department of Sheep and Goat Breeding
Ciszewskiego 8 St, 02-786 Warsaw, Poland

SUMMARY – The experiment has been carried out on 78 lambs of Zelaznenska sheep. Ewes and their lambs were divided into two groups. Group I during the rearing period has been kept under an umbrella roof, group II in a barn. The growth rate of lambs has been estimated and ultrasonic measurements of m.l.d. muscle and carcass quality of 20 ram lambs have been made. The results obtained showed that environmental conditions did not significantly negatively affect body weight growth, however caused an unimportant reduction of subcutaneous fat thickness and meatiness of the loin part of the lamb's body. Maintenance under the umbrella roof contributed to carcass quality improvement, which has been proved by a significantly higher lean meat content in the hind leg.

Keywords: Sheep, maintenance conditions, growth rate, carcass quality.

RESUME – *"La vitesse de croissance et la qualité bouchère de carcasses d'agneaux de la race polonaise de plaine, variété Zelaznenska, tenus dans différentes conditions d'élevage". Les recherches ont été effectuées sur un troupeau de 78 agneaux mâles et femelles Zelaznenska. Les mères avec des agneaux ont été partagées en deux lots. Au cours de l'élevage le groupe I était tenu sous hangar, tandis que le groupe II était élevé en bergerie. L'analyse de la vitesse de croissance des agneaux et la mesure du muscle L.d. faite par ultra-sons ont été effectuées, ainsi que l'analyse de carcasse de 20 agneaux mâles. On a constaté que les conditions d'élevage n'avaient pas d'impact significatif sur le poids et la vitesse de croissance des agneaux. Par contre, ces facteurs ont contribué à la faible réduction d'épaisseur de la graisse de couverture et à la meilleure musculature de la partie dorsale-lombaire. L'élevage sous hangar a contribué à l'amélioration de la qualité de carcasse ce qui est prouvé par la teneur significativement supérieure en tissus musculaires du gigot.*

Mots-cles : *Moutons, conditions d'élevage, vitesse de croissance, qualité de carcasses.*

Introduction

Zelaznenska type of Polish Lowland sheep is the local breed maintained under "National program of conservation genetic resources of domestic animals" (Ministry of Agriculture and Rural Development, 2000). That breed is characterized by high reproductive performance. The average lifetime fecundity expressed as number of lambs weaned per ewe per year number reach 1.5. That's why Zelaznenska sheep is considered as good maternal component to slaughter lambs production (Kuznicka *at al*., 2005). Also there is possibility to utilize local breeds of sheep to landscape conservation and grazing on waste land, which is connected with extensive production system. In relation to above mentioned the aim of presented study was estimation of meat performance of zelaznenska lambs reared in different maintenance conditions.

Materials and methods

The experiment has been carried out on 78 ewe and ram lambs of Zelaznenska sheep. Ewes and their lambs were divided into two groups. Group I during the rearing period has been kept under umbrella roof, the group II in barn. All animals were fed farm produced fodder according to standards. From the 2nd week of life lambs had free access to crushed oat and hay. The lambing season took

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place on the turn of February and March when air temperature dropped below 0ºC. The lambs were weighted after birth and than in 3 week intervals. On the base of weighing the body weight at birth and at the age of 28th, 56th and 100th has been estimated. Also the growth rate between mentioned above periods was calculated. At the 100th day of life the ultrasonic measurements of *musculus longisimus dorsi* (m.l.d.) on the last thoracic vertebrae has been performed using 5 MHz transducer. After the weaning (at the age of 100th days) lambs from both groups has been kept at the same conditions as during the nursing period.

At the age of 120 days 10 ram lambs from each group were slaughtered to carcass quality estimation using methodology given by National Research Institute of Animal Production (Nawara *et al*., 1963).

The results has been calculated by variance analysis method using SPSS 12.0 software (2003).

Results

The lambs reared in barn obtained 400 g higher average birth weight in comparison to these from umbrella roof, while at the weaning that difference raised up to 700 g. In both groups the distribution of lamb's sex and litter size was similar. Initially lambs from group I achieved higher growth rate, but at the period between 56th and 100th day of life lambs reared in barn grew faster. All mentioned above differences were small and statistically insignificant (Table 1). Presented results were similar to these obtained in previous study conducted on Zelaznenksa type lambs reared in barn (Rant and Niznikowski, 2003).

Table 1. Body weight growth and daily gains of lambs reared in different maintenance conditions

Traits	Umbrella roof (Group I)		Barn (Group II)	
	Mean	S_E	Mean	S_E
Birth body weight (kg)	4.92	0.15	5.32	0.17
Body weight at 28th day (kg)	12.53	0.32	12.75	0.36
Body weight at 56th day (kg)	19.28	0.61	19.21	0.69
Body weight at 100th day (kg)	26.30	1.02	26.99	1.16
Daily gains between 1st and 28th day of life (g/day)	281.67	9.99	275.45	11.34
Daily gains between 1st and 56th day of life (g/day)	261.10	10.37	252.56	11.77
Daily gains between 28th and 56th day of life (g/day)	241.28	12.41	230.49	14.08
Daily gains between 1st and 100th day of life (g/day)	215.93	10.14	218.94	11.51
Daily gains between 28th and 100th day of life (g/day)	191.28	11.92	197.75	13.52
Daily gains between 56th and 100th day of life (g/day)	159.46	15.23	176.92	17.29

Ultrasonically measured m.l.d muscle depth and area were statistically significant higher in group of lambs reared in barn (Table 2). The differences in fat thickness over m.l.d muscle has not been found. Obtained results, regarding subcutaneous fat thickness and m.l.d. muscle area, achieved lower values compared to these reported by Rant and Niznikowski (2003) where 3.5 MHz transducer has been used.

The carcass quality analysis of ram lambs showed significantly larger hind leg circumference and higher values of other carcass measurements in group II what suggests better carcass conformation in that group (Table 3). However, highly significantly greater hind leg weight and its content in half carcass indicate higher carcass quality of ram lambs reared under umbrella roof. Also that was confirmed by significantly higher meat weight at that group after hind leg dissection. Although statistical differences has not been found in dissected fat weight the carcasses of ram lambs from group I were characterized by over 2% lower fat content in hind leg. Significantly higher meat and

lower fat content in hind led dissection has been reported also by Markiewicz and Gruszecki (2004).

Table 2. Life ultrasonic measurements of m.l.d. muscle of lambs reared in different maintenance conditions

Traits	Umbrella roof (Group I)		Barn (Group II)	
	Mean	S_E	Mean	S_E
Fat thickness over m.l.d muscle (mm)	1.22	0.05	1.28	0.05
Muscle depth (mm)	19.35	0.33	20.54*	0.38
Muscle width (mm)	40.55	0.71	40.76	0.81
Muscle area (cm^2)	5.81	0.16	6.27*	0.18

*Statistical significance at P≤0.05.

Table 3. Carcass characteristic of ram lambs reared in different maintenance conditions

Traits	Umbrella roof (Group I)		Barn (Group II)	
	Mean	S_E	Mean	S_E
Carcass measurements				
Hind leg length (cm)	24.62	0.41	25.25	0.41
Hind leg deepness (cm)	17.92	0.32	18.36	0.32
Hind leg circumference (cm)	34.85	0.39	36.07*	0.39
Hind leg tightness index (%)	141.54	2.17	143.13	2.16
Fat thickness over m.l.d. muscle (mm)	0.81	0.09	0.97	0.09
M.l.d. muscle width (cm)	5.42	0.14	5.44	0.14
M.l.d. muscle depth (cm)	2.47	0.08	2.56	0.08
Weight and contents of cuts in half carcass				
Hind leg weight (kg)	1.63**	0.02	1.55	0.02
Hind leg content (%)	28.27**	0.28	26.85	0.28
Loin weight (kg)	0.38	0.01	0.40	0.01
Loin content (%)	6.70	0.22	6.92	0.22
Best end neck weight (kg)	0.37	0.01	0.37	0.01
Best end neck content (%)	6.38	0.18	6.45	0.18
Valuable cuts weight (kg)	2.43	0.04	2.36	0.04
Valuable cuts content (%)	41.95	0.51	40.80	0.50
Hind leg dissection				
Fat weight (kg)	0.18	0.02	0.21	0.02
Fat content (%)	10.57	0.91	12.80	0.90
Meat weight (kg)	1.17*	0.03	1.05	0.03
Meat content (%)	70.78	1.67	67.97	1.66
Bones weight (kg)	0.32**	0.01	0.28	0.01
Bones content (%)	19.76	0.51	18.44	0.51

*Statistical significance at P≤0.05; **Statistical significance at P≤0.01.

Probably lambs kept under umbrella roof had higher nutrient requirements and higher energy expenditure, despite of slower growth rate, caused lower fat tissue deposition and higher lean content in hind leg, which is working muscle (Kuznicka, 1997; Lawrence and Stibbards, 1990; Sormunen and Antila, 1987).

Conclusions

Environmental conditions did not significantly effected decreasing of body weight growth, however caused unimportant reduction of subcutaneous fat thickness and meatiness of loin part of lamb's body. But maintenance under umbrella roof contributed carcass quality improvement what has been proved by significantly higher lean meat content in hind leg.

References

Kuznicka, E. (1997). *The effect of forced walking on decrease of fat deposition in lambs carcasses*. Scientific Papers of Department of Sheep and Goats Breeding, Warsaw Agric. Univ., pp. 90-101.

Kuznicka, E., Rant, W. and Niznikowski, R. (2005). The estimation of lifetime reproductive performance of Zelaznenska sheep. *Roczniki Naukowe Zootechniki,* Supl., 21: 41-44.

Lawrence, P.R. and Stibbards, R.J. (1990). The energy costs of walking, carrying and pulling loads on flat surfaces by Brahman cattle and swamp bufalo. *Anim. Prod.,* 50: 29-39.

Markiewicz, J. and Gruszecki T.M. (2004). *Ocena wynikow tuczu jagniąt utrzymywanych na pastwiskach nizinnych*. Materialy VI Owczarska Szkola Zimowa, pp. 111-117.

Ministry of Agriculture and Rural Development (2000). *National program of conservation genetic resources of domestic animals*.

Nawara, W., Osikowski, M., Kluz, I. and Madelska, M. (1963). *Wycena trykow na podstawie badania wartosci potomstwa w stacjach oceny trykow Instytutu Zootechniki za rok 1962*. PWRiL, Warszawa.

Rant, W. and Niznikowski, R. (2003). The characteristic of growth rate and fleshiness value of lambs in the flock of Zelaznenska strain of Polish Lowland sheep selected on high prolificacy. *Polish Society of Animal Production. Applied Science Reports,* 68(3): 147-155.

Sormunen, R. and Antila, U. (1987). *Intensive fattening of lambs*. Symp. on Intensive Prod., Helsinki (Finland), pp. 123-126.

SPSS (2003). *SPSS Base 12.0 Users Guide*. SPSS Inc.