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## ANALYSIS OF PARAMETERS OF FATTENING ABILITY AND CARCASS VALUE OF RAM LAMBS OF THE CHAROLLAIS BREED

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Two experiments were established to evaluate parameters of fattening ability and carcass value of ram lambs, the Charollais breed, bred in the fencing grazing system. The aim of the first experiment was to assess parameters of fattening ability and carcass value of ram lambs at two levels of diet. The second experiment was dealt with the effect of age and live weight of ram lambs at slaughter on parameters of the fattening ability and carcass value. The experiment comprised 24 ram lambs from single lambs and multiple litters (in ratio 1 : 3) which were divided in the same ratio into three groups (control and two experimental groups) eight animals in each. The control group had available mother's milk, quality pasture grass, salt lick and water *ad libitum*. The control group had identical diet and was supplementary fed on the concentrate mixture at the ration 200 animal/day. After 61 days of lasting of an experiment, after 24 hour fasting the control slaughter was carried out. Carcass weight of hot and cold dressed body along with slaughter weight were determined after slaughter. Carcass bodies were divided into the following cuts: ham, kidney, chop, butt, side, neck, and flank. Ram lambs in the experimental group II were fed on the same diet like the control group of ram lambs, but without supplementary feed and in the same flock. The total time of pasture fattening of the experimental group II was prolonged by further 76 days. At the end of experiment ram lambs were slaughtered and after slaughter the same parameters like in the first slaughter were determined. The total weight gain of the ram lambs of the experimental group I during experiment (61 days) amounted to 16.5 + 0.99 kg, average daily gain was 271 ± 16.27 g and in the control group 15.9 ± 0.58 kg, 261 ± 9.45 kg; differences were not statistically significant. Hot and cold slaughter weight and fattening ability of killed ram lambs were not affected by fattening. Differences in weight of ham, chop, and kidney, which represent quality grade I of the slaughter body were not found as a result of fattening. The total weight gain of ram lambs of the experimental group II during experiment (137 days) attained 23.4 + 0.89 kg, average daily weight gain was 171 ± 1.06 g and in the control group (length of fattening – 61 days) 15.9 ± 0.58 kg, 261 ± 9.45 g. The difference between the experimental group

II and the control group was significant. Statistically significant difference ( $P \leq 0.05$ ) was found in the weight of ham, which was  $7.50 \pm 0.53$  kg in the experimental group and  $5.86 \pm 0.16$  kg in the control group. Chemical analysis found significant difference in the fat content in dependence on the effect of age of ram lambs. It follows from the results herein that age of ram lambs affected significantly parameters of fattening ability and carcass values.

Charollais breed; ram lambs; fattening; carcass value; age

## INTRODUCTION

When concentrating sheep rearing on meat utility parameters of fattening ability and carcass value which are an inseparable part of the breeding value are important. Investigations, evaluation and utilization of this information in the breeding process enables to maintain the standard in the carcass value and to improve required traits which present a picture of breeds, families and groups of progeny qualities.

In transition to grazing fattening of sheep even greater emphasis is placed on fencing grazing. Evaluation of growth ability and carcass value of ram lambs in practical farming conditions is a significant measure for utilization of the given breed in a certain region.

One of the possibilities how to reduce the consumption of concentrated feed in sheep is introduction of spring lambing when lambs coming from this lambing are carried together with dams on the pasture and are not supplementary fed during grazing season (Fantová et al., 1986). As reported Göhler and Lienberger (1972) daily weight gains which are in negative correlation to the content of visceral and subcutaneous fat are important and in turn, they are in high positive correlation to full-value cuts of the carcass. Slaná and Jakubec (1976) consider an average daily weight gain as an important indicator, because except the direct influence on the efficiency of fattening, it is in positive correlation to the quality indicators, such as deposition of muscular substance and low production of fat. Slaná (1978) reports that regarding slaughter, a weight of ham, which forms roughly two thirds of cut meat of quality grade I is an important indicator. Ham is also an indicator of the total meatiness of lambs. She also presents that among indicators of slaughter value, dressing percentage has a lower predictability.

After Gajdošík and Polách (1984) dressing percentage rises with increasing age and live weight, as percentage of meat share rises and share of bones is falling.

A lot of authors report that with increasing slaughter weight, fat content, which limits the carcass weight to which lambs are fattened, is rising as well (Solomon et al., 1980; Gajdošík, Polách, 1984; Hawkins et al., 1985).

Results of Slaná and Jakubec (1976) indicate that with higher dressing percentage more cut meat is obtained what is, of course, economically more advantageous. Šiler et al. (1980) state that increase of dressing percentage is expressed by relative decrease of the growth of visceral organs and some components of slaughter by-products (skin, limbs, etc.). Simultaneously with increase of dressing percentage, the share of valuable parts is growing too. Champion et al. (1976, as quoted by Šiler et al., 1980) found that in increase of live weight by 10 kg, the share of valuable cut parts increases by 5.46 kg. Ingr (1987) gives the following chemical analysis of meat from ham of slaughtered lambs: 34.8% dry matter, 17.1% proteins, 16.7% fat, and 65.2% water.

## MATERIAL AND METHOD

Two experiments were established to evaluate parameters of fattening ability and carcass value of ram lambs of the Charollais breed, bred in the fencing grazing system.

The experiment comprised 24 ram lambs from singles and multiple litters (in ratio 1 : 3) which were divided in the same ratio into three groups (control and two experimental groups), eight animals in each. Ram lambs were housed on deep litter from their birth and had available mother's milk, quality hay, concentrate mixture, water and salt lick *ad libitum*.

Live weight at birth and then fortnightly was found in ram lambs always in the morning and in the same weighing machine with accuracy to 0.1 kg.

After the fourth weighing ram lambs together with dams were transferred into three separate grazing fenced plots of the acreage about 2.0 hectares.

### Experiment I

The aim of the experiment I was to evaluate parameters of fattening ability and carcass value of ram lambs at two levels of nutrition.

In the control group at the beginning of the trial ram lambs were on average 66.3 days old and average live weight was 22.7 kg. Feed ration was composed of mother's milk and quality pasture grass. In addition, they had available salt lick and water. All components were available *ad libitum*.

In experimental group I at the beginning of the trial an average age of ram lambs was 68.9 days and average live weight was 22.6 kg. They were fed by

the same way like the control group, and supplementary fed on 200 g concentrate mixture in composition ČOJ II, oat meal and barley meal in ratio 1 : 1 : 1.

Chemical composition of concentrate mixture was as follows: dry matter 86.48%, fat 2.58%, crude protein 18.34%, ash 4.10 %, fibre 6.05%, Ca 3.03 g/kg, P 4.87 g/kg.

At the end of the trial average age of ram lambs in the control group was 127.3 days with average live weight 38.6 kg and in experimental group I animals were 129.9 days old and live weight was 39.8 kg. The experiment lasted 61 days.

After 24 hour of fasting a live weight of ram lambs was found followed by slaughter. Then carcass weight of hot and cold carcass after 24 hour hanging out and dressing percentage was found.

Carcasses were divided into different individual carcass cuts: ham, kidney, chop, butt, side, neck and flank.

All parts of the carcass were weighed and registered and moreover, left ham was unboned and meat samples for chemical and sensory analyses were taken (of 70 g weight from each ham from *m. biceps femoris*). Sensory and chemical analyses were performed by the Czech Agricultural and Food Inspection.

#### Experiment II

Experiment II was dealt with effect of age and live weight of ram lambs at slaughter on parameters of fattening ability and carcass value.

Ram lambs in experimental group II were 69.3 days old on average and average live weight was 21.9 kg.

At the end of experiment average age of ram lambs in experimental group II was 206.3 days with average live weight 45.3 kg. Ram lambs in experimental group II were observed for 137 days. Ram lambs of experimental group II were fed identically as the control group of ram lambs in the first experiment, i.e. without supplementary feed and in the same flock. The total time of grazing fattening of experimental group II was prolonged by 76 days.

After 24 hour fasting ram lambs were killed and after slaughter the same parameters were found like in the first slaughter of the control group at the age of 127.3 days. The first and the second slaughters were carried out by the same team of workers.

At the end of the experiment the obtained results were evaluated by the method of variance analysis (the Scheffé test was used for determination of significance of differences).

## RESULTS AND DISCUSSION

### Experiment I

Parameters of ram lamb fattening are presented in Tab. I.

Ram lambs in the experimental group with supplementary feeding exhibited better and faster growth than ram lambs in the control group but the difference between experimental group I and control group was insignificant. In the experimental group I the total weight gain of ram lambs during experiment was  $16.5 \pm 0.99$  kg, average daily weight gain  $271 \pm 16.27$  g and in the control group  $15.9 \pm 0.58$  kg,  $261 \pm 9.45$  kg, resp. The results found by us correspond with those found by M o m a n i S h a k e r et al. (1995, 1996) in the Charollais breed.

From the point of view of lamb meat processing, carcass weight and dressing percentage are very important.

Results of the weight of carcass and dressing percentage of ram lambs in warm and cold stage are presented in Tab. II.

Hot and cold carcass weight and dressing percentage of slaughtered ram lambs were not affected by supplementary feeding. The lowest dressing per-

I. Parameters of ram lamb fattening

Parameter	Experimental group I	Control group	Experimental group II
	$n = 8$ $\bar{x} \pm s_{\bar{x}}$ a	$n = 8$ $\bar{x} \pm s_{\bar{x}}$ b	$n = 8$ $\bar{x} \pm s_{\bar{x}}$ c
Live weight at the beginning of experiment (kg)	$22.6 \pm 0.79$	$22.7 \pm 0.91$	$21.9 \pm 0.85$
Age at the beginning of experiment (days)	$68.9 \pm 1.25$	$66.3 \pm 1.99$	$69.3 \pm 1.99$
Live weight at the end of experiment (kg)	$39.1 \pm 1.04$	$38.6 \pm 0.63^c$	$45.3 \pm 2.15^b$
Age at the end of experiment (days)	$129.9 \pm 1.25$	$127.3 \pm 1.24^c$	$206.3 \pm 1.49^b$
Live weight at slaughter on an empty stomach (kg)	$34.6 \pm 0.75$	$35.0 \pm 0.71^c$	$42.1 \pm 2.09^b$
Total weight gain during experiment (kg)	$16.5 \pm 0.99$	$15.9 \pm 0.58^c$	$23.4 \pm 0.89^b$
Duration of experiment (days)	$61 \pm 0.00$	$61 \pm 0.00$	$137 \pm 0.00$
Average daily weight gain (g)	$271 \pm 16.27$	$261 \pm 9.45^c$	$171 \pm 1.06^b$

## II. Parameters of carcass value of ram lambs

Parameter	Experimental group I	Control group	Experimental group II
	$n = 8$	$n = 8$	$n = 8$
	$\bar{x} \pm s_{\bar{x}}$	$\bar{x} \pm s_{\bar{x}}$	$\bar{x} \pm s_{\bar{x}}$
	a	b	c
Hot carcass weight (kg)	16.56 ± 0.56	17.18 ± 0.50 <sup>c</sup>	22.24 ± 2.08 <sup>b</sup>
Cold carcass weight (kg)	16.42 ± 0.55	16.99 ± 0.52 <sup>c</sup>	21.96 ± 1.18 <sup>b</sup>
Hot carcass yield (%)	47.87 ± 0.81	49.02 ± 0.71 <sup>c</sup>	52.45 ± 0.87 <sup>b</sup>
Cold carcass yield (%)	47.41 ± 0.85	48.49 ± 0.75 <sup>c</sup>	51.95 ± 0.88 <sup>b</sup>

centage of cold carcass (47.41 ± 0.85%) was found in ram lambs in experimental group I – compared with the ram lambs of the control group (48.49 ± 0.75%) this difference was insignificant. Our results are in congruency with those obtained by Kuchník et al. (1996) and Momaní Shaker et al. (1996) with the same breed.

Kuchník and Padovská (1994) during the control slaughter of six Charollais ram lambs found an average slaughter weight 41.18 kg, average dressing percentage 49.74% and weight of cold carcass 20.54 kg.

Weight and share of different parts of the carcass of ram lambs are given in Tab. III.

When compared the weight of different parts of the carcass of ram lambs in dependence on supplementary feed, it was found that supplementary feeding affected statistically significantly ( $P \leq 0.05$ ) weight of neck, in favour of experimental group I with supplementary feed. Another significant differences in the weight of different parts of the carcass of ram lambs between the experimental group I and the control group were not found.

When evaluating the percentage of different parts of the carcass of ram lambs between the experimental group I and the control group in dependence on supplementary feed, significant differences were found in percentages of kidney, side, and neck ( $P \leq 0.05$ ). The share of kidney in carcasses of experimental group I was 7.88 ± 0.19% and in control group 8.17 ± 0.39%.

As to the weight of most valuable parts of the carcass (ham and chop), more significant differences between experimental group I and control group were not found. The shares of different parts of the carcass found by us are close to the values as reported by Momaní Shaker et al. (1995, 1996) and Kuchník et al. (1996).

## III. Weight and shares of different parts of the carcass

Parameter	Experimental group I	Control group	Experimental group II
	$n = 8$	$n = 8$	$n = 8$
	$\bar{x} \pm s_{\bar{x}}$	$\bar{x} \pm s_{\bar{x}}$	$\bar{x} \pm s_{\bar{x}}$
	a	b	c
Cold carcass weight (kg)	16.42 ± 0.55	16.99 ± 0.52 <sup>c</sup>	21.96 ± 1.18 <sup>b</sup>
Weight of leg (kg)	5.65 ± 0.21	5.86 ± 0.16 <sup>c</sup>	7.50 ± 0.53 <sup>b</sup>
Weight of loin (kg)	1.30 ± 0.07	1.39 ± 0.08	1.39 ± 0.83
Weight of rib (kg)	0.85 ± 0.04	0.90 ± 0.06 <sup>c</sup>	1.61 ± 0.52 <sup>b</sup>
Weight of chuck (kg)	3.00 ± 0.11	3.06 ± 0.12 <sup>c</sup>	4.44 ± 0.31 <sup>b</sup>
Weight of middle neck (kg)	1.10 ± 0.07	1.21 ± 0.11	1.25 ± 0.17
Weight of neck (kg)	1.06 ± 0.06 <sup>b</sup>	0.94 ± 0.03 <sup>a</sup>	0.92 ± 0.06
Weight of flank (kg)	3.47 ± 0.12	3.62 ± 0.17 <sup>c</sup>	4.52 ± 0.37 <sup>b</sup>
Share of leg (%)	34.40 ± 0.47	34.54 ± 0.33	34.08 ± 1.15
Share of loin (%)	7.88 ± 0.19 <sup>b</sup>	8.17 ± 0.39 <sup>ac</sup>	7.86 ± 0.27 <sup>b</sup>
Share of rib (%)	5.15 ± 0.17	5.26 ± 0.24 <sup>c</sup>	7.38 ± 0.27 <sup>b</sup>
Share of chuck (%)	18.28 ± 0.21	18.05 ± 0.43 <sup>c</sup>	20.23 ± 0.85 <sup>b</sup>
Share of middle neck (%)	6.72 ± 0.44 <sup>b</sup>	7.14 ± 0.61 <sup>ac</sup>	5.78 ± 1.03 <sup>b</sup>
Share of neck (%)	6.44 ± 0.29 <sup>b</sup>	5.57 ± 0.16 <sup>ac</sup>	4.18 ± 0.11 <sup>b</sup>
Share of flank (%)	21.13 ± 0.38	21.27 ± 0.66 <sup>c</sup>	20.49 ± 0.83 <sup>b</sup>

Carcass analysis of the ham is presented in Tab. IV. In experimental group I average weight of meat on ham was 2.11 ± 0.10 kg, average weight of bone on ham 0.68 ± 0.05 kg and in the control group 2.17 ± 0.11 kg, 0.71 ± 0.03 kg. The difference between experimental group I (with supplementary feed) and control group was not significant. Supplementary feed did not affect the share of meat and bone on ham between experimental group I and control group. Our results are in congruency with the data of Momaní Shaker et al. (1995, 1996) found in the Charollais breed.

Chemical analysis did not found significant difference in the content of dry matter, fat and proteins in dependence on the effect of supplementary feed.

Chemical analysis of muscles of the ham of ram lambs was carried out by Kuchník et al. (1996). The values found by them in dry matter content 25.53% are lower compared with our results, whereas protein content 20.37% corresponds with our results in the same breed.

#### IV. Carcass traits of ham

Parameter	Experimental group I	Control group	Experimental group II
	$n = 8$	$n = 8$	$n = 8$
	$\bar{x} \pm s_{\bar{x}}$	$\bar{x} \pm s_{\bar{x}}$	$\bar{x} \pm s_{\bar{x}}$
	a	b	c
Left ham (kg)	2.79 ± 0.15 <sup>b</sup>	2.88 ± 0.13 <sup>ac</sup>	3.84 ± 0.27 <sup>b</sup>
Boneless ham, meat on ham (kg)	2.11 ± 0.10 <sup>b</sup>	2.17 ± 0.11 <sup>ac</sup>	2.93 ± 0.25 <sup>b</sup>
Bone on ham (kg)	0.68 ± 0.05	0.71 ± 0.03 <sup>c</sup>	0.91 ± 0.03 <sup>b</sup>
Share meat/ham (%)	75.6 ± 1.12	75.3 ± 1.23	76.3 ± 1.51
Share bone/ham (%)	24.4 ± 0.99	24.7 ± 1.11	23.7 ± 1.17

In sensory evaluated characters, such as flavour, taste, consistency, juiciness, samples were given by individual critics grade I, rarely grade II of the used scale. As to the flavour and taste the sample exhibited a typical character of the lamb in given treatment, meat was fine, adequately tender and juicy.

The results reveal that supplementary feed did not affect parameters of fattening ability and carcass values.

#### Experiment II

In the experiment II ram lambs of the control group which were slaughtered at the age of 127.3 days and ram lambs of the experimental group II which were fed identically with the ram lambs of the control group and slaughtered at the age of 206.3 days were compared. It was found that age affects significantly the rate of growth ( $P \leq 0.05$ ).

In the experimental group II the total weight gain of ram lambs during experiment (137 days) was  $23.4 \pm 0.89$  kg, average daily weight gain was  $171 \pm 1.06$  g and in the control group (length of fattening 61 days)  $15.9 \pm 0.58$  kg,  $261 \pm 9.45$  g. The difference between experimental group II and control group was significant.

In evaluation of hot and cold carcass weight and dressing percentage of slaughtered ram lambs in dependence of their age, the differences between experimental group II and control group were significant ( $P \leq 0.05$ ).

The highest dressing percentage of hot carcass ( $52.45 \pm 0.87\%$ ) had ram lambs in experimental group II which were slaughtered at the age of 206.3 days. Compared with ram lambs in the control group ( $49.02 \pm 0.71\%$ ) this

difference was significant. Our results are in congruency with the data reported by Solomon et al. (1980) and Hawkins et al. (1985).

Weight and share of individual parts of the carcass of ram lambs are presented in Tab. III. It was found that age affects significantly weight and share of individual parts of the carcass of ram lambs (Tab. III).

Age of slaughtered ram lambs affected shares of individual parts of the carcass by the fact that in some parts of the carcass higher shares (share of chop and butt) and in turn, lower in some parts were found (share of kidney, side, neck and flank) when compared with slaughtered ram lambs aged 127.3 days.

Statistically significant difference ( $P \leq 0.05$ ) was found in the weight of ham which was in the experimental group  $7.50 \pm 0.53$  kg and in the control group  $5.86 \pm 0.16$  kg.

Carcass analysis of ham is presented in Tab. IV. If weight and share of meat and bone on ham are evaluated as depended on age of ram lambs, it was found that age affects significantly weight of meat on ham. The results show that share of meat on ham is increasing with age and share of bones is decreasing (Tab. IV).

Chemical analysis detected a significant difference in the content of dry matter, fat and proteins in dependence on the age of ram lambs (Tab. V). In spite of increase of slaughter weight of lambs to 45.3 kg, share of fat in meat of ham increased only to 11.5% while water content and proteins decreased and dry matter content increased. Our results are in congruency with the data reported by Solomon et al. (1980), Gajdošík, Polách (1984) and Hawkins et al. (1985).

#### V. Chemical analysis of meat from ham

Parameter	Experimental group I	Control group	Experimental group II
	$n = 8$	$n = 8$	$n = 8$
Water (%)	74.9	74.1	69.2
Dry matter (%)	25.1	25.9	30.8
Fat (%)	4.5	5.3	11.5
Proteins (%)	20.1	20.2	18.5

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**Analýza ukazatelů výkrmnosti a jatečné hodnoty beránek plemene charollais.**

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Byly založeny dva pokusy k vyhodnocení ukazatelů výkrmnosti a jatečné hodnoty beránek plemene charollais chovaných v oplůtkovém systému.

Cílem prvního pokusu bylo hodnocení ukazatelů výkrmnosti a jatečné hodnoty beránek při dvou úrovních výživy.

V druhém pokusu jsme se zabývali vlivem věku a živé hmotnosti beránek před porážkou na ukazatele výkrmnosti a jatečné hodnoty.

Do pokusu bylo vybráno 24 beránek pocházejících z jedináček a vícečetných vrhů (v poměru 1 : 3), kteří byli ve stejném poměru rozděleni do tří skupin (kontrolní a dvě pokusné) po 8 zvířatech.

Kontrolní skupina měla k dispozici mateřské mléko, kvalitní pastevní porost, solný liz a vodu *ad libitum*, pokusná skupina I byla při stejném krmení příkrmována jadernou směsí v množství 200 g na kus a den. Po 61 dnech trvání pokusu byla po 24hodinovém vyláčení provedena kontrolní porážka.

Po porážce byla zjištěna jatečná hmotnost opracovaného těla za tepla i za studena a byla zjištěna jatečná výtěžnost.

Jatečné trupy byly rozbourány na jednotlivé jatečné části: kýtu, ledvinu, kotletu, plec, šrůtku, krk a bok.

Beránci v pokusné skupině II byli krmeni stejně jako kontrolní skupina beránek v prvním pokuse, tj. bez příkrmu a ve stejném stádě. Celková doba pastevního výkrmu pokusné skupiny II se tedy prodloužila o dalších 76 dnů. Na konci pokusu byli beránci poraženi a po porážce byly zjištěny stejné ukazatele jako u první porážky.

V pokusné skupině I byl celkový přírůstek beránek během pokusu (61 dnů)  $16,5 \pm 0,99$  kg, průměrný denní přírůstek  $271 \pm 16,27$  g a v kontrolní skupině  $15,9 \pm 0,58$  g,  $261 \pm 9,45$  g; rozdíly nebyly statisticky významné.

Jatečná hmotnost za tepla i za studena a výtěžnost poražených beránek nebyly ovlivněny příkrmem. Vlivem příkrmu nebyly zjištěny rozdíly v hmotnosti kýty, kotlety a ledviny, které představují I. kvalitu jatečného těla.

V pokusné skupině II byl celkový přírůstek beránek během pokusu (137 dnů)  $23,4 \pm 0,89$  kg a průměrný denní přírůstek  $171 \pm 1,06$  g a v kontrolní skupině (délka výkrmu 61 dnů)  $15,9 \pm 0,58$  kg a  $261 \pm 9,45$  g. Rozdíl mezi pokusnou skupinou II a kontrolní skupinou byl významný.

Statisticky významný rozdíl ( $P \leq 0,05$ ) byl zjištěn v hmotnosti kýty, která byla v pokusné skupině  $7,50 \pm 0,53$  kg a v kontrolní skupině  $5,86 \pm 0,16$  kg.

Chemickou analýzou byl nalezen významný rozdíl v obsahu tuku v závislosti na vlivu věku beránek.

Z uvedených výsledků vyplývá, že věk beránek významně ovlivnil ukazatele výkrmnosti a jatečné hodnoty.

charollais; beránci; výkrmnost; jatečná hodnota; věk

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