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Effect of Castration on Growth and Carcass Characteristics of Egyptian Local Baladi Goats and their Crosses with Alpine and Anglo-Nubian

Einfluß der Kastration auf das Wachstum und den Schlachtkörperwert der Lokalziege und ihrer Kreuzungen mit Alpine- und Anglo-Nubian-Ziegen

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1 Introduction

The goat is hardly and prolific animal with excellent foraging ability. It is adapted to wide climate conditions and can successfully survive in hot, arid and semi-arid zones unsuitable for other livestock. In Egypt the goat population is approximately 1.5 million (STATISTICAL HAND BOOK, 1983). Goat meat is a cheap and popular and can be utilized to satisfy the increasing demand for food in developing countries. Improving the meat production abilities of goats in such regions is important in this respect. DEVENDRA and BURNS (1983) have shown that tropical goats typically grow at a rate of 0.5 kg/week. Crossing of tropical goats with temperate goat breeds such as Saanen, Anglo-Nubian and Alpine improved their growth rate and meat production (MUKUNDAN and BHAT, 1978; MUKUNDAN et al., 1982; BELLO and BABIKER, 1988). As long as consumers, continue to reguest leaner meat, there will be a need for methods of identifying leanear carcasses. Therefore the present study was carried out to investigate the effects of crossing Egyptian Baladi goats with Alpine and Anglo-Nubian and castration (complete and partial castrated vs. uncastrated) on growth performance and carcass characteristics of progeny male kids.

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2 Materials and Methods

During the period from 1989 to 1992 an experimental project was carried out at the Department of Animal Production, Faculty of Agriculture, Minia University, Minia, Egypt, to improve both meat and milk production of Egyptian Local Baladi goats by crossing with Alpine (AL) and Anglo-Nubian (AN) breeds.

Baladi (B), Alpine (AL) and F_1 of Anglo-Nubian and Baladi (AN.B) does were bred by Baladi, Anglo-Nubian and Alpine bucks to produce Baladi, Alpine and crossbred kids. Mating started at one year of age for both does and bucks. Three matings were made in two years. Does and bucks were joined for two months in each mating period, after which the two sexes were separated. At birth, each kid was ear-tagged and weighed, thereafter the kids were weighed regularly at biweekly intervals till one year old. Used in this experiment fifty-three progeny male kids born during 1989 and 1990 and representing four different genotypes namely, (B xB), (AN x B), AN x (AN.B) and (AL x B); the first letters represent the buck and the second the doe. At four weeks of age male kids were divided into three groups, the first group was completely castrated, the second was hemicastrated and the third were left intact. Castration was practiced surgically by the open method. All kids were allowed to run free with their mothers until weaning at 120 days of age. Does and their kids grazed Egyptian clover (*Trifolium alexandrinum*) during winter and green maize during summer, in addition to 0.5 kg/head/day of pelleted concentrate mixture. Bean straw was given *ad libitum* to animals during the period from May to December of the year. The goats were allowed to drink water 3-4 times/day. After weaning till slaughter at one year of age, male kids were given growing and fattening rations consisting of pelleted concentrate mixture and bean straw accoding to Morrison Standards (1956). The pelleted concentrate mixture consisted of 25% decorticated cotton seed meal, 26% wheat bran, 20% cotton seed hulls, 17% corn, 7% rice bran, 2% molasses, 2% calcium carbonate and 1% common salt.

Body weight and live body measurements (height at wither, body length, heart depth and girth, abdomen depth and girth, width at hooks and cannon length and girth) were taken just prior to slaughter after being fasted for 16 hours. After bleeding, skinning and evisceration, the carcass was carefully splitted into two equal sides. The right side was divided into several cuts, (neck, breast, shoulder, ribs, loin and leg). The cuts were weighed and deboned. The 9-11th rib cut from the left side of carcass was separated and the per cent of lean, fat and bone was calculated. The boneless meat of the 9-11th rib cut was minced in an electric mincer and well mixed. The moisture, crude protein, ether extract and ash were estimated in each sample according to A.O.A.C (1970). The cross-sectional area of the *longissimus dorsi* area between 11th and 12th rib of the left side of each carcass was measured.

A least squares model of S.A.S (1982) was employed in the statistical analysis to estimate growth performance and carcass characteristics and factors affecting them. The model was:

$Y_{ijk} = u + a_i + s_j + as_{(ij)} + e_{ijk}$ where, Y_{ijk}, an observed value; u, overall mean; a_i fixed effect due to breed type of male kids (a = from 1 to 4); s_j, fixed effect due to state of castration 1 = complete castrated, 2 = partial castrated and 3 = uncastrated); $as_{(ij)}$, fixed effect due to interaction between breed and castration; e_{ijk}, random deviation due to unexplained sources. Tukey test (JOHN et al., 1985) was used to test the differences between means. The usefulness of pre-slaughter weight and body measurements were studie in predicting dressed carcass weight using multiple linear regression technique (SNEDECOR and COCHRAN, 1967).

3 Results and Discussion

3.1 Performance of kids

Least squares means with their standard errors (± S.E) and the result of the analysis of variance of body weights at 1, 6 and 12 months of age and body weight gain (from 1-12 month of age) are presented in Table 1.

Tab. 1: Result of analysis of variance and least squares means ± S.E of body weights and body weight gain

Classification		No. Anim. of age	Live body weight (kg) at 1st month of age	Live body weight (kg) at 6th months of age	Live body weight (kg) at 12 months	Body weight gain (kg/week)
Breed types:			*	*	n.s.	n.s.
Baladi	B	15	4.6±0,28^{b}	12.8±1.05^{b}	25.9±0,75	0.44±0.01
1/2 AL 1/2	B	10	5.8±0.32^{a}	16.0±1.02^{ab}	26.4±0.85	0.43±0.02
1/2 AN 1/2	B	13	5.5±0.29^{a}	13.5±1.08^{ab}	25.1±0.77	0.41±0.01
3/4 AN 1/4	B	15	5.5±0.31^{ab}	16.6±1.13^{a}	25.5±0.81	0.42±0.02
Castration:			n.s.	n.s.	**	**
Complete		17	5.9±0.36	14.5±0.95	23.6±0.68^{b}	0.37±0.10^{b}
Partial		14	5.1±0.38	15.1±1.05	27.5±0.74^{a}	0.47±0.01^{a}
Intact		22	5.0±0.34	14.5±0.90	26.0±0.64^{b}	0.44±0.01^{a}

Means with different superscripts differ significantly ($P < 0.05$).
* effect is significant at $P < 0.05$: ** at $P < 0.01$; n.s. not significant

3.1.1 Effect of breed type

Breed type of kids significantly ($P < 0.05$) affected body weights at 1 and at 6 months of age. SALLAM et al. (1990) reported significant differences ($P < 0.05$ and $P < 0.01$) on body weights at birth, 3, 6 and 9 months of age due to breed type of kids. It could be noticed that, crossbred kids were heavier than pure Baladi kids at 1 and 6 months of age (Table 1). There were no significant differences between the three types of crossbred kids for live body weight at 1 and 6 months of age. However, the 3/4 AN 1/4 B group of crossbred kids exceeded 1/2 AN 1/2 B crossbred kids in average live body weight at 6 and 12 months of age. This may be due to that crossbred mothers of first group may have good potential for rearing their kids than those of pure Baladi mothers in the second group. ACHARYA (1990) reported that, crossing local goats with exotic breeds improved body weight, but reproductive performance declined, especially the incidince of multiple births. Anglo-Nubian goats perform well. Also it could be noticed that although pure Baladi kids showed the lowest value of body weight at 1 and 6 months of age but reached to similar or relatively heavier body weights at 12 months of age than those of crossbred kids as they had significantly ($P < 0.01$) higher value for relative weight (6.1) vs. (4.7 to 4.8) for the crossbred kids. This means that pure Baladi kids could compensate retardation in growth rate after 6 months of age. Average of body weight gain ranged between 0.41 to 0.44 kg/week and were not affected significantly by breed type. KANAUJIA et al. (1985) reported that daily gain preweaning or postweaning for kids was not affected significantly by breed group. DEVENDRA and BURNS (1983) showed that tropical goats typically grow at a rate of 0.5 kg/week.

3.1.2 Effect of castration

Castration has a significant effect ($P < 0.01$) on values of body weight at 12 months of age and body weight gain (from 1-12 months of age) (Table 1). Partially castrated animals showed the highest values for traits mentioned above, followed by values of intact male kids, while the complete castrated animals showed the lowest value in that respect. This means that the growth rate was relatively faster in partial castrated animals than in other groups. This result agree with the findings of MOGHA et al. (1984). Gonad hormones influence bone growth and epiphyseal fusion (BOURNE, 1971). Since the production of testosterone is not affected by partial castration, faster growth rate is expected in this method than in complete castration where secretion of testosterone is completely stopped. Similar observations were noted by GRIGORESCU (1963) and MOGHA et al. (1984). On the other hand, LOUCA et al. (1977) and BABIKER et al (1985) reported that complete castration reduced the rate of gain.

The interaction between breed and castration showed a significant effect ($P < 0.05$) on values of body weight at 6 months of age and body weight gain during the period from 1-12 months of age.

3.2 Carcass traits

Least squares means with their standard errors (± S.E) and the result of the analysis of variance for pre-slaughter weight and carcass traits are presented in Table 2.

Tab. 2: Result of analysis of variance and least squares means ± S.E of pre-slaughter weight and carcass traits

Classification		No. Anim. (S.W)	pre-slaughter live weight	carcass weight	dressing percentage	meat/bone ratio S.W	% non-visceral components/ S.W.*	% visceral** fat/S.W. S.W	% edible*** offals/
Breed types:			n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Baladi	B	15	25.7±0.70	12.0±0.46	47.0±0.86	3.0±0.11	16.1±0.56	3.0±0.22	3.4±0.11
1/2 AL 1/2	B	10	25.6±0.80	12.2±0.52	47.7±0.98	2.9±0.13	16.1±0.63	2.5±0.25	3.6±0.13
1/2 AN 1/2	B	13	24.9±0.72	11.8±0.47	47.0±0.89	3.1±0.11	15.5±0.57	2.7±0.12	3.3±0.11
3/4 AN 1/4	B	15	24.7±0.76	12.0±0.49	48.4±0.93	2.9±0.12	15.7±0.61	3.0±0.24	3.4±0.12
Castration:			**	*	n.s.	*	**	*	**
Complete		17	25.2±0.64^{b}	11.2±0.41^{b}	48.1±0.78	3.2±0.10^{a}	15.1±0.50^{b}	3.8±0.20^{a}	2.6±0.10^{b}
Partial		14	27.3±0.70^{a}	12.8±0.46^{a}	46.7±0.86	2.8±0.11^{b}	17.3±0.55^{a}	2.2±0.22^{b}	3.6±0.10^{a}
Intact		22	25.3±0.60^{b}	12.2±0.39^{ab}	47.7±0.74	3.0±0.09^{ab}	15.3±0.47^{a}	2.4±0.19^{b}	3.5±0.11^{a}

\+ Non-visceral components = head + skin + 4 legs
++ Visceral fat = fat of (rumen + heart + testis + kidneys)
+++ Edible offals = liver + heart + kidney + testis

3.2.1 Effect of breed type

Breed type of kids indicate insignificant effect on pre-slaughter weight and all carcass traits studied. As known that most carcass traits are more affected by pre-slaughter weight than other factors (EL-FEEL et al., 1990); therefore as the pre-slaughter weight value is not affected significantly by breed type, this may be the reason of similarity among Genetic groups for most carcass traits studies. EL-BAYOMI and EL-SHEIKH (1988) reported that, breed groups had insignificant effect on carcass weight and dressing percentage. Data showed that crossbreed kids especially 3/4 AN 1/4 B and 1/2 Alpine 1/2 B had relatively higher value of dressing percentage (48.4 and 47.7%, respectively) than those of pure Baladi kids (47.0%). Similar trend was observed by SALLAM et al. (1990). SINGH et al. (1982) reported that dressing percentage was highest in Beetal goats (42.71%) followed by those in Anglo-Nubian x Beetal (38.78%) and Alpine x Beetal (37.45%). SINGH et al. (1985) working with Jamnapari x Black Bengal and Pure Black Bengal kids, slaughtered at one year of age, reported that dressing percentage of Jamnapari x Black Bengal was 45.71 being significantly ($P < 0.05$) higher than the pure bred Black Bengal kids (41.94%).

It could be concluded that pure Baladi kids have good potential for meat production.

3.2.2 Effect of castration

Castration was found to have a significant effect ($P < 0.05$ and $P < 0.01$) on pre-slaughter weight and all carcass traits studied except dressing percentage. BAYRAKTARCLU et al. (1990) working with goats castrated at 1 week of age and slaughtered at 10 months of age, reported that dressing percentage was significantly similar for intact and castrated goats (50.27 vs. 50.44%, respectively). ALLAN and HOLST (1990) reported that when kids slaughtered at an average body weight of 20 kg, intact animals had a lowest ($P < 0.05$) dressing percentage than castrated animals (44.4 vs. 48.4%), but at 26 kg, intact and castrated animals had similar dressing percentages (45.3 and 45.1% respectively). They suggested that decisions on castration should depend upon the carcass weight desired. Present data show that partial castrated animals had higher values for pre-slaughter weight, carcass weight and both percentages of non-visceral components (head + skin + 4 legs) and edible offals (liver + heart + testis + kidneys) weights related to pre-slaughter weight, followed by uncastrated animals, while complete castrated animals showed the lowest values of the four traits mentioned above. Also it could be noticed that, partial castration modify ($P < 0.05$) the amount of visceral fat (fats of rumen + testis + heart + kidneys) related to slaughter weight (2.2 vs. 3.8%) and increased ($P < 0.05$) the amount of edible offals related to slaughter weight (3.6 vs. 2.6%) comparing with those of complete castrated one. Dressing percentage tended to be higher (48.1 vs. 46.7%) in complete castrated animals than those in partial castrated ones, (Table 2). MOGHA et al. (1984) found that values of dressing percentage were 36.42 and 35.76 and 35.6% for partial and complete castrated and uncastrated kids, respectively. The differences were not significant. BABIKER et al. (1985) reported that dressing percentage was slightly lower for the intact than for the complete castrated kids (45.82 vs. 47.56%, respectively).

Concerning the interaction between breed and castration, it showed a significant effect ($P < 0.01$) on pre-slaughter weight and ($P < 0.05$) on both values of carcass weight and the percentage of visceral fat related to slaughter weight.

3.3 Carcass cuts

Least squares means and their standard erros (æ S.E) and the result of the analysis of variance for carcass cuts expressed as percentage to whole carcass weight are presented in Table 3.

3.3.1 Effect of breed type

Breed type of kids had significant effect ($P < 0.01$ or $P < 0.05$) on all carcass cuts except both shoulder and leg goints which did not differ significantly. The percentage of the total goints which comprise the highest proportion of best quality meat (shoulder + ribs + loins + leg) differ significantly ($P < 0.01$) by breed type; infavouring of pure Baladi and 1/2 AN 1/2 B group which showed similar and highest values (83.3

Tab. 3: Result of analysis of variance and least squares means ± S.E of carcass cuts

Classification		No. Anim.	Neck %	Breast %	Shoulder %	Ribs %	Loin %	Leg %	Prime cuts %
Breed types:			**	**	n.s.	**	*	n.s.	**
Baladi	B	15	9.1±0.40^{c}	7.6±0.28^{b}	22.2±0.27	17.0±0.49^{a}	13.8±0.42^{b}	30.3±0.67	83.3±0.40^{a}
1/2 AL 1/2	B	10	10.6±0.45^{ab}	8.0±0.32^{a}	21.3±0.31	17.1±0.56^{a}	13.9±0.48^{b}	28.2±0.76	80.4±0.45^{b}
1/2 AN 1/2	B	13	9.1±0.40^{c}	7.8±0.29^{b}	21.9±0.28	17.2±0.50^{a}	15.6±0.44^{a}	28.4±0.69	83.1±0.41^{a}
3/4 AN 1/4	B	15	11.2±0.43^{a}	8.2±0.30^{ab}	21.7±0.29	14.3±0.53^{b}	14.7±0.46^{ab}	30.0±0.72	80.7±0.43^{b}
Castration:			**	n.s.	n.s.	n.s.	n.s.	*	**
Complete		17	8.9±0.36^{b}	8.4±0.25	21.8±0.25	15.6±0.38^{a}	15.2±0,38^{a}	30.1±0.60^{a}	82.7±0.36^{a}
Partial		14	9.9±0.40^{b}	7.7±0.28	21.7±0.27	17.0±0.49^{a}	14.0±0.42^{b}	29.7±0.66^{a}	82.4±0.40^{a}
Intact		22	11.3±0.34^{a}	8.3±0.24	21.8±0.23	16.6±0.42^{ab}	14.2±0.36^{b}	27.9±0.57^{b}	80.5±0.34^{b}

+ Prime cuts = shoulder + ribs + loin + leg

and 83.1%, resp.), while both types of 1/2 Alpine 1/2 B and 3/4 AN 1/4 B showed similar and lowest values (80.4 and 80.7%, resp., Table. 5). KANAUJIA et al. (1985) found that weights of thorak, brisket, thigh and croup cuts were affected significantly by breed types of goats.

3.3.2 Effect of castration

Castration was found to have a significant effect ($P < 0.01$ or $P < 0.05$) on percentages of neck and leg cuts related to carcass weight. Complete and partial castrated animals had similar and highest values of leg cut (30.1 and 29.7 vs. 27.9%) and had similar and lowest values of neck cut (8.9 and 9.9 vs. 11.3%) than those of uncastrated animals. Consequently, complete and partial castrated animals had significantly ($P < 0.01$) higher percentage of prime cuts related to carcass weight than those of uncastrated ones (82.7 and 82.4 vs. 80.5%, resp.). Accordingly, the castration of goats seems to be a favourable procedure for improving meat quality in goats. Similar results were found by EL-BAYOMI and EL-SHEIKH (1989). BAYRAKLAROGLU et al. (1990) reported that hindquarter weight (hind leg plus loin) was higher (36.57 vs. 35.0%) in castrated than in intact kids. Also SYE (1983) found that the carcass of intact goats had significantly greater weights of neck, shoulder, ribs, forequarter than those of castrated goats.

Data showed that shoulder and rib cuts and prime cuts were affected significantly ($P < 0.05$ and $P < 0.01$) by interaction between breed and castration.

3.4 Physical and chemical components of 9-11th rib cut

Least squares means and their standard errors (± S.E) and the result of the analysis of variance for physical and chemical components of 9-11th rib cut are presented in Table 4.

Tab. 4: Result of analysis of variance and least squares means ± S.E of seperate lean fat and bone of the 9-11th rib cut and chemical analysis of boneless meat in 9-11th rib cut

Classification		No. Anim.	Physical components			Chemical analysis (on fresh basis)			
			lean %	fat %	bone %	moisture %	protein %	fat %	ash %
Breed types			n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Baladi	B	15	62.4±1.43	11.5±1.14	26.1±1.31	63.9±1.37	18.4±0.72	16.7±1.20	1.0±0.05
1/2 AL 1/2	B	10	64.3±1.63	13.1±1.30	22.1±1.50	62.3±1.55	19.9±0.82	16.7±1.37	1.0±0.05
1/2 AN 1/2	B	13	66.3±1.47	11.0±1.13	22.8±1.36	62.8±1.44	20.1±0.75	16.0±1.24	1.1±0.05
3/4 AN 1/4	B	15	67.0±1.55	11.7±1.24	21.3±1.42	63.1±1.47	20.4±0.78	15.3±1.30	1.1±0.05
Castration:			n.s.	*	n.s.	**	n.s.	**	n.s.
Complete		17	64.0±1.29	$14.1±1.04^{a}$	21.9±1.19	$58.8±1.24^{b}$	$20.2±0.66^{a}$	$20.0±1.09^{a}$	1.0±0.04
Partial		14	64.7±1.43	$11.1±1.14^{ab}$	24.1±1.31	$55.8±1.36^{a}$	$18.1±0.72^{b}$	$15.1±1.02^{b}$	1.0±0.05
Intact		22	66.7±1.22	$10.2±0.98^{b}$	23.1±1.12	$64.5±1.17^{a}$	$20.9±0.62^{a}$	$13.5±1.03^{b}$	1.1±0.04

Means with different superscripts differ significantly ($P < 0.05$)

3.4.1 Effect of breed type

Breed types of kids had no significant effect on both physical and chemical components of 9-11th rib cut of carcass. Baladi kids did not differ significantly from their crosses in percentages of lean, fat and bone of 9-11th rib cut. Similarly, SEEBECK (1966), ARNOLD et al. (1979) and EL-BAYOMI and EL-SHEIKH (1989) reported non-significant breed effect on these physical components in goats. Data on chemical analysis of meat in 9-11th rib cut show similar trend for breed effect. EL-BAYOMI and EL-SHEIKH (1989) reported that the effect of breed on moisture content in meat of 9-11th rib cut was significant ($P < 0.05$), while its effects on protein, fat and ash contents was non-significant. SALLAM et al. (1990) found that breed type of kids had no significant effect on both percentages of moisture and protein but percentages of fat and ash differed significantly ($P < 0.05$). Eye muscle area was affected significantly by breed type infavouring Baladi and 1/2 AN 1/2 B types (10.5 and 10.2 cm^2, resp.) while 1/2 Alpine 1/2 B and 3/4 AN 1/4 B showed similar and lowest ones (8.8 and 9.3 cm^2, resp.). CHAWLA and NATH IQBAL (1979) showed significant breed differences in eye muscle area.

3.4.2 Effect of castration

The effect of castration on fat percentage in 9-11th rib cut was significantly ($P < 0.05$) while its effect on lean and bone percentages was not significant. EL-BAYOMI and EL-SHEIKH (1989) reported that the effect of castration on lean and fat percentages in 9-11th rib cut was highly significant, while its effect on bone percentage was not significant. Data show that complete castrated animals had higher fat percentage followed by partial castrated animals while uncastrated animals showed the lowest value in that respect. Similar results were obtained by BABIKER et al. (1985), MISRA et al.

(1986) and EL-BAYOMI and EL-SHEIKH (1989). The relatively greater proportion of lean in 9-11th rib cut (66.7%) of uncastrated animals compared with 64.7 and 64.0% for partial and complete castrated animals in a favourable characteristics and may be attributed to the anabolic effect of testicular hormones which lead to greater muscular development (HAMMOND et al., 1983). Also, the relatively greater proportion of fat in the meat of castrates agrees with the general observation about the greater ability of castrated animals to lay on fat (HAMMOND et al., 1983). GIMENEZ et al. (1989) concluded that removal of gonadal steroids increases significantly the rate of lipogensis in adipose tissue of male goats.

Results on chemical analysis of meat in 9-11th rib cut confirm its physical components where complete castrated animals had significantly ($P < 0.01$) higher percentage of fat 20.2, while partial castrated animals and uncastrated ones had similar and lowest values in that respect (15.1 and 13.5%, resp.). Reverse trend was observed concerning moisture content where complete castrated animals had significantly ($P < 0.01$) lower value (58.8%) than those of partial castrated animals and uncastrated ones (65.8 and 64.5%, resp.). The significantly higher ether extract and lower moisture content in castrates than in entire males is an agreement with the findings of MOGHA et al. (1984), MISRA et al. (1986) and EL-BAYOMI and EL-SHEIKH (1989).

Eye muscle area was not affected significantly by castration. But the differences between means were significant ($P < 0.05$) where partial castrated animals had higher value (10.5 cm^2) while complete castrated and uncastrated animals had similar and lowest values in that respect (9.1 and 9.5 cm^2, resp.). EL-BAYOMI and EL-SHEIKH (1989) reported that eye muscle area was not significantly affected by castration.

3.5 Relationship between carcass weight and live body measurements

Partial regression coefficients of carcass weight on body measurements only (prediction equation I) or on body measurements plus pre-slaughter body weight (prediction equation II) in male goats are presented in Table 5). It could be noticed that from pre-slaughter body measurements only where determination coefficient (R^2) was high and ranged from 0.87-0.97 or from both pre-slaughter body measurements plus live body weight where R^2 ranged from 0.93-0.98 one can efficiently predict the carcass weight of male kids. Data showed also that using body weight in prediction equation enhanced the value of accuracy of prediction. Similar results were obtained by SINGH et al. (1982) they reported that live body weight, body length and heart girth of goats contributed to a large percentage of variance in carcass characteristics. However, pre-slaughter weight accounted for maximum variance. EL-FEEL et al. (1990) reported that using pre-slaughter body measurements in prediction equation for most carcass traits of buffalo and cow male calves, is possible by reasonable level of accuracy.

It could be conducted that, pure Baladi kids have good potential for growth and meat production under Upper Egypt conditions comparing by their crosses with both Alpine

Tab. 5: Partial regression coefficients of carcass weight on pre-slaughter live body measurements of male goats

Mean values of live body measurements				Regression coefficients							
Character	Baladi (B)	1/2 AN 1/2 B	3/4 AN 1/4 B	Prediction equation (I)				Predicition equation (II)			
				Baladi (B)	1/2 AN 1/2 B	3/4 AN 1/4 B	All	Baladi (B)	1/2 AN 1/2 B	3/4 AN 1/4 B	All
R^2				0.89	0.97	0.87	0.65	0.94	0.98	0.93	0.85
Intercept				-19.55	-17.51	-19.47	-18.33	-5.81	-21.06	2.10	-6.14
Height at withers	59.7	59.3	61.2	-0.20	0.21	0.04	0.16 *	-0.26	0.28	-0.18	0.04
Body lenght	56.1	55.3	56.3	0.45	0.13	-0.22	0.12	0.23	0.09	-0.03	-0.01
Heart girth	68.7	69.3	67.3	-0.31	0.04	0.54	0.15 *	-0.23	-0.13	0.13	0.03
Abdomen girth	69.8	73.1	72.8	0.45 *	0.11	-0.10	0.11 **	0.30	0.22	-0.12	0.03
Chest depth	26.0	26.5	25.9	-0.76	0.15	-1.48 **	-0.17	-0.66	0.17	-0.67	-0.08
Abdomen depth	26.2	27.4	26.6	0.83	-0.13	1.85 **	0.15	0.37	0.08	0.90	0.09
Width at hooks	10.8	10.1	10.2	0.97	-0.14	-0.29	-0.11	0.81	-0.04	0.25	-0.10
Cannon length	12.9	13.3	13.6	0.72	-0.46	-0.02	-0.04	0.82	0.04	0.02	0.20
Cannon girth	7.8	7.8	7.7	-1.69	0.70	1.19	-0.20	-0.76	-0.84	-0.32	-0.21
Pre-slaughter weight	25.9	25.1	25.5	—	—	—	—	0.35	0.19	0.59	0.45 **

R = determination coefficient, * Significant ($P < 0.05$), ** Significant ($P < 0.01$).
Prediction equation (I) include body measurements only as independent variables while in prediction equation (II) include bptj body measurements and pre-slaughter weight as independent variables.

and Anglo-Nubian kids. Also castration of goats at earlier age and slaughter at high body weight seems to be a favourable procedure for improving meat production and quality. Addition that, partial castration modify the amount of fat in carcasses. From pre-slaughter live body measurements one can efficiently predict the carcass weight of kids.

4 Summary

Fifty-three male Baladi kids (B) and Baladi crosses with Alpine (1/2 AL 1/2 B) and Anglo-Nubian (1/2 AN 1/2 B and 3/4 AN 1/4 B) born at the farm of Animal production, Minia, Egypt, over a period of 2 years (1989 to 1990) were used. At four weeks of age male kids which represent the four mentioned genotypes were randomely distributed into three groups: the first was completely castrated, the second was partially castrated and the third group was left intact. Kids were weaned at 4 months and slaughtered at 12 months of age.

Breed types of kids significantly ($P < 0.05$ and $P < 0.01$) affected body weights at 1 and 6 months of age, infavouring crossbred kids. But body weights at 12 months of age were not significantly different by breed type of kids. Baladi kids had insignificantly high value of body weight gain than those of crossbred kids during the period from castration till slaughter. Castration had a significant effect ($P < 0.01$) on live

body weight at 12 months of age and on body weight gain during the period from castration till slaughter, infavour of partially castrated animals.

Breed type of kids showed non-significant effect on most carcass traits, while castration had a significant effect ($P < 0.05$ and $P < 0.01$) on most carcass traits. Partially castrated animals had higher values of slaughter weight (S.W), carcass weight, percentages of non-visceral components and edible offals related to slaughter weights and had lower values for both meat/bone ratio in carcass and percentage of visceral fat related to slaughter weight than those of other groups.

Baladi and 1/2 AN 1/2 B groups showed the highest percentage of prime cuts related to slaughter weight, but 1/2 AL 1/2 B and 3/4 AN 1/4 B had the lowest values. Castration had a significant effect on percentages of both neck and leg cuts related to carcass weight, where castrated animals showed highest percentage of prime cuts related to slaughter weight.

Breed type of kids showed non-significant effect on both physical components and chemical analysis of the 9-11th rib cut but castration showed a significant effect on percentages of fat and moisture in 9-11th rib cut where complete castrated animals had higher value of fat and lower value of moisture in lean.

Using partial castration procedure enhanced both growth performance and meat production and modified the amount of carcass fat. The carcass weight of male goat kids could be predicted from pre-slaughter live body measurements.

Zusammenfassung

53 männliche Lämmer der Lokalrasse (B) und ihrer Kreuzungen mit Alpine- (1/2 Al, 1/2 B) and Anglo-Nubian (1/2 AN, 1/2 B and 3/4 AN, 1/4 B) Ziegen standen auf dem Versuchsbetrieb 1989/1990 zur Verfügung. Im Alter von 4 Wochen wurden die Lämmer der 4 Zuchtgruppen zufällig auf 3 Behandlungsgruppen verteilt. Neben der unkastrierten Gruppe wurde die Wirkung der Voll- und Teilkastration auf das Wachstum und die Schlachtkörpermerkmale bei einem Schlachtalter von 12 Monaten untersucht.

Die Kreuzungslämmer zeigten signifikant höhere Körpergewichte im Alter von 1 und 6 Monaten als die reinrassigen Lämmer der Lokalrasse. Am Ende der Mast, im Alter von 12 Monaten, war kein Unterschied im Körpergewicht zwischen den Zuchtgruppen festzustellen.

Die Teilkastration zeigte positive Wirkung auf die Mastleistung der Lämmer bis Ende der Mastperiode.

Bezüglich der Schlachtkörperbeurteilung war kein Unterschied zwischen der Zuchtgruppen vorhanden, aber wohl in der Schlachtkörperzerlegung.

Die Teilkastration hatte positive Wirkung auf die Schlachtkörperfraktionen. Gleichzeitig aber zeigten diese Tiere die negative Wirkung der Kastration auf die Verfettung des Schlachtkörpers.

In der physikalischen und chemischen Eigenschaften des Fleisches war kein Unterschied zwischen den Zuchtgruppen festzustellen. Der erwartete Effekt der Kastration auf den Fettanteil im Fleisch wurde statistisch abgesichert.

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