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EFFECT OF GENOTYPE AND MATURE WEIGHT PERCENTAGES ON CARCASS YIELD, PHYSICAL COMPOSITION, JOINTS AND CHEMICAL COMPOSITION OF CROSSBRED GOATS

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ABSTRACT

Seventy two goat kids, represented four genetic groups each consisted of 18 animals {1/4Damascus (D), 3/4Barki (B)) (1/2D*1/2B), (3/4D*1/4B) and (7/8D*1/8B)} each group of kids was divided into three equal subgroup of similar average body weight, they were slaughtered at 50%, 65% and 85% of the mature weight respectively. The (7/8D*1/8B) genotype and 85% mature weight showed heaviest slaughter weight, hot carcass weight, gut content weight, total offal's weight, edible offal parts weight and offal's fat weigh, while the (1/4D*3/4B) genotype and 50% mature weight were lighter for the same traits. In the left side, (7/8D*1/8B) genotype had the heaviest lean weight, the genotype (7/8D*1/8B) exceed the genotype (1/4D*3/4B) in lean weight by 39%, while the differences between genotype (1/4D*3/4B) and genotype (1/2D*1/2B) was 0.08% only. When carcass weight was expressed as percentage of live body weight genotypes appeared to differ significantly with (7/8D*1/8B) having higher dressing percentage followed by the (1/4D*3/4B), (3/4D*1/4B) and then the genotype (1/2D*1/2B). While when carcass weight was expressed as percentage of empty body weight genotypes appeared to differ highly significantly with (7/8D*1/8B) having higher dressing percentage followed by the (3/4D*1/4B), (1/2D*1/2B) and then by the (1/4D*3/4B). Lean percentage were higher in (7/8D*1/8B) genotype was followed by (3/4D*1/4B), (1/2D*1/2B) and then by (1/4D*3/4B). Lean percentage in genotypes carcass ranged between 61% and 65%. The genotype effect on the bone percentage in (leg, shoulder and best end of neck) joints was significant but the bone percentage differences in Middle neck and breast joints were insignificant, while the bone percentage differences in loin and scarg were significant. On the other hand, the effect of mature weight on bone percentage in joints of leg, shoulder and loin were highly significant but the bone percentage differences in best end of neck and breast joints were insignificant, while the bone percentage differences in middle neck and scrag were significant. Total fat weight in left side was heavier in genotype (7/8D*1/8B) than other genotypes followed by (3/4D*1/4B), (1/2D*1/2B) and then genotype (1/4D*3/4B). The differences among genotypes were highly significant effect on Total fat weight in left side and on Total fat percentage. Total fat percentage was higher in genotype (1/4D*3/4B) followed by (1/2D*1/2B), (3/4D*1/4B) and then genotype (7/8D*1/8B). Results concluded that crossing D with B resulted in improving carcass characteristics, also, slaughtering at 85% mature weight improved all studied traits.

INTRODUCTION

Goat and sheep are significant meat producing animals with goats being the more important in the less developed parts of the world. There are about 768 million goats and 1,028 billion sheep in the world. (FAO, (2004)). The value of meat animals lies in the acceptability of the carcass on the market. According to Owen,. and Norman, (1977).the demand for goat meat exceeds supplies in many parts of the world, notably in the tropics and subtropics, where 74% of the world's goat meat is produced. Consequently, goat meat is sold at premium prices, and is increasingly substituted by "cheaper" mutton .Consumer preference for goat meat or mutton is dictated by cultural and traditional background and the socio-economic status of the community. Generally, goat meat is consumed (1) by those who culturally do not eat beef and find goat an acceptable substitute for lamb and mutton; and (2) by rural Egyptians for whom goats are traditionally part of their livestock, but these are of lower status value than beef (Schapera, 1959). Discrimination against goat meat arises when sheep and cattle are the dominant sources of red meat. These then set standards for growth, feed conversion, carcass evaluation and palatability of meat against which goats are evaluated. These standards are some of the adversities that have to be overcome before the full potential of goat meat.

Carcasses of meat animals are generally evaluated commercially in terms of yield and quality of lean. In beef carcasses, yield refers to the percentage of closely trimmed, boneless retail cuts (edible lean) on a carcass weight basis. Quality of lean refers to the palatability (taste appeal) of the lean and is perceived as being strongly influenced by the degree of marbling (intramuscular fat deposition). Since most goat carcasses are not presently marketed in typical retail cuts and since goat meat is primarily valued for its un marbled lean, this evaluation scheme seems somewhat inappropriate for goat least for now. Instead, goat processors seem to pay particular attention to dressing percent and to "muscling" or "meatiness", both terms reflecting an assessment of meat-to-bone ratios. However, processors do prefer young goats than 40 kg live weight) to show considerable fat deposition around the kidneys and heart. Experienced goat buyers are quite adept at palpating the loin/rib area of a live kid and predicting degree of muscling and kidney fat and, accordingly, the visual and commercial appeal of the carcass to buyers. Contrarily, older, heavier carcasses are discriminated against if they have more than a (poorly defined) minimum of fatness. The objective of the current study was to determine the influence of genotype and mature weight of kids on carcass characteristics.

MATERIALS AND METHODS

The present study was carried out at the Borg EL-Arab Station belonging to Animal Production Research Institute, Ministry of Agriculture Egypt, on 72 crossbred kids. Each genetic group consisted of 18 kids **{**1/4Damascus (D), 3/4Barki (B)) (1/2D*1/2B), (3/4D*1/4B) and (7/8D*1/8B)}each group of kids was divided into three equal subgroup of similar average body weight (6 animals each). The first subgroup was slaughtered at 50% of the mature weight, the second subgroup was slaughtered at 65% of the mature weight, and third subgroup was slaughtered at 85% of the mature weight. All animals were fed on pelleted confinement mixture at a rate of 2% of body weight (The concentrate mixture contained at least 62%TDN and 11.3% crude digestible protein) and berseem hay adlibitum as a source of roughage. Animals were affered water twice daily.

Slaughter trail:

At the end of the fattening period, 48 kids (12 (¼D*¾B), 12 (½D*½B), 12 (¾D*¼B) and12 (7/8D*1/8B)}slaughtered at 50%, 65% and 85% of the mature weight (4 animals of each subgroup). Mature body weight was estimated by Maharem ((1990)). as 31 kg for (¼D*¾B), 33 kg for (½D*½B), 38 kg for (¾D*¼B) and 51 kg for (7/8D*1/8B)

After an overnight fasting kids were weighed then they were weighed after slaughtering and shining, weight of all abdominal and thoracic offal's were recorded, the alimentary tract was weighted full, and empty, the weight of the gut fill was subtracted from slaughter weight to obtain the empty body weight.

Carcass jointing tissue disuse dissection:

The carcasses was split lengthwise into two sides. The left side was cut according to M.L.C.(1970) into 7 joints namely leg, loin, best end of neck, shoulder, middle neck, scrag and breast. In each joint the subcutaneous fat was removed, the lean tissue was then separated from the bones and intramuscular fat was separated from the lean. Weight of tissues were recorded and calculated as percentages of the joint weight. Weight of the wholesale cuts were expressed as percentages of cold carcass side weight.

Meat chemical composition:

The best end of neck joint was taken as a sample joint for chemical analysis. The lean and fat disseted from this joint were minced in an electric mincer several times until a homogeneous mixture was formed. For each animals, sample of the mixture was taken and kept in freezer until chemical analysis. Moisture, ash, protein and fat contents were determined according to the A.O.A.C.(1970).

Statistical analysis

Data were analyzed using GLM procedure (SAS, 1999), constant was fitted for the effects of genotype and percentages of mature weight. The following model was applied to obtain estimates for the investigated traits: =

$y_{ijk} = \mu + B_i + P_j + (BP)_{ij} + e_{ijk}$

Where:

y_{ijk} : The observation $_{ij}$

μ : The overall mean

Bi : The fixed effect of genotypes i =1, 2, 3, 4, for {((¼D*¾B), (½D*½B), (¾D*¼B) and (7/8D*1/8B))}, respectively .

P_j : The fixed effect of matures weight $_j$ =1,2&3.

$(BP)_{ij}$: The interaction effect between genotype and mature weight.

e_{ijk} = random error.

RESULTS AND DISCITION

Carcass yield

Least squares means and SEM of the studied traits of four genotypes kids [(1/4D*3/4B), (1/2D*1/2B), (3/4D*1/4B) and (7/8D*1/8B)] which slaughtered at (50%, 65% and 85%) matures weight percentage are presented in Table (1). The (7/8D*1/8B) genotype and 85% mature weight had the heaviest slaughter weight, hot carcass weight, gut content weight, total offal's weight, edible offal parts weight and offal's fat weight, while the

(1/4D*3/4B) genotype and 50% mature weight had the lowest weight of the same traits. In general weight of studied traits increased as blood of Damascus increased. Genotypes and mature weight had highly significant effect on all traits except on Offal's fat weigh. The present results are in agreement with Gaili, (1976)., Maharem,((1990)), Miller *et al.* ((2000)) Oman *et al.* ((2004)), and Frank Pinkerton *et al.* ((2006)). Ueckerman,(1969) concluded that heavier goats dress higher than lighter goats by 2-4%. The hot carcass weight (7/8D*1/8B) and kids mature weight 85% was higher than the genotype (1/4D*3/4B) and mature weight 50% by 33% and 38% respectively in hot carcass (kg).Oman *et al.* ((2004)), reported that the crossbreeding resulted in heavier carcass weights.

Gut content was higher in the genotype (1/2D*1/2B) and (3/4D*1/4B) than that in the (1/4D*3/4B) genotype by about 44% and 35%, respectively and this was the reason for the high of dressing percentage of the genotype (1/4D*3/4B and low for the genotype (1/2D*1/2B) and (3/4D*1/4B). The animals slaughtered at 85% mature weight were higher gut content than the animals slaughtered at 50% mature weight while the those slaughtered at 65% mature weight were intermediate. This was the reason for the high of dressing percentage of the animals were slaughtered at 50% mature weight. The differences were highly significant among genotypes and matures weight on gut content The present results are in agreement with Maharem,(1990), Miller *et al.* ((2000)) Oman *et al.* (2004), and Frank Pinkerton *et al.* (2006).The (7/8D*1/8B) genotype had the heaviest weight of edible offal's followed by (3/4D*1/4B), (1/2D*1/2B) and then by the backcross kids (1/4D*3/4B). Also, edible offal's weight increased as mature weight percentage increased. On the other hand, for the same trait as percentage of live weight, the genotype (1/4D*3/4B) and mature 50% had highest edible offal parts percentage among all genotypes and mature weight studied. This may be due to the heavier slaughter weight of (7/8D*1/8B) than the genotype (1/4D*3/4B).The differences were almost highly significant among genotypes and matures weight The present results are in agreement with Maharem,(1990), Miller *et al.* ((2000)) Oman *et al.* (2004), and Frank Pinkerton *et al.* (2006).

Total offal's weight and offal fat weight were higher in the genotype (7/8D*1/8B) than in the genotype (1/4D*3/4B) while there were no differences between the genotype (1/4D*3/4B) and (1/2D*1/2B), this difference may be due to that the slaughter weight for the genotype (7/8D*1/8B) was greater than that of the genotype (1/4D*3/4B). The differences between the genotype (7/8D*1/8B) and the genotype (1/4D*3/4B) in total offal's weight may be due to differences in offal's fat weight. On the other hand, the total offal's as percentage of live weight, the genotype (1/4D*3/4B) and mature weight 50% had the highest total offal's percentage among all genotypes and matures weight studied. The differences were almost highly significant among genotypes and matures weight on Total offal's weight and offal fat weight except the effect of genotype on offal fat weight which was insignificant. The present results are in agreement with., Maharem,(1990), Miller *et al.* ((2000)) Oman *et al.* (2004).

T1-2

When carcass weight was expressed as percentage of live body weight genotype showed significant effect. The (7/8D*1/8B) had highest dressing percentage followed by the (1/4D*3/4B), (3/4D*1/4B) and then by the genotype (1/2D*1/2B). While when carcass weight was expressed as percentage of empty body weight, the differences among genotypes were highly significantly. The (7/8D*1/8B) had the highest dressing percentage followed by the (3/4D*1/4B), (1/2D*1/2B) and then by the genotype (1/4D*3/4B). On other hand, the insignificant effect was shown for matures weight percentage on carcass weight was expressed as percentage of live body weight or of empty body weight. When carcass weight was expressed as percentage of live body weight the percent value ranged between 45.95-48.29 among genotypes, while when carcass weight was expressed as percentage of empty body weight the percent value ranged between 54.06-57.35 among genotypes. On the other hand dressing percentage of goats varies between 44% and 55% (Naude and Hofmeyr, 1981), and between 40.3% at 10 kg live weight and 52.4% at 41 kg live weight of Boer goats (Casey, 1982). It may even reach 56.2% in entire male goats Gibb, *et al.* 1993.In a comparative trial, mean dressing percentage of Boer goats was remarkably high (48.3%) as reported by Casey and. Van Niekerk (1988).While the present results are in agreement with Maharem,(1990), Miller *et al.* ((2000)**)** Oman *et al.* (2004).

Carcass joints

Weights and percentage of cold left side and its wholesale joints are shown in Table (2) & (3) respectively. The cold left side was heavier in genotype (7/8D*1/8B) than other genotypes, the differences between genotype (1/4D*3/4B) and genotype (7/8D*1/8B) was 32%, while the differences between genotype (1/4D*3/4B) and genotype (1/2D*1/2B) was 0.08% only. The cold left side weight of kids slaughtered at 85% mature weight was heavier than other mature weights. Differences in side weight due to that genotype or mature weights were highly significant. The genotype (7/8D*1/8B) had the heaviest joint weight followed by (3/4D*1/4B) , (1/2D*1/2B) and then by (1/4D*3/4B). This was mainly because of the higher dressing percentage and heavier body weight (7/8D*1/8B). All individual joints at 85% mature weight were heavier than other mature weights. When weights of joints were expressed as percentages of cold left side weight, differences due to genotype were highly significant on beast end of neck, scrag and breast, significant only on shoulder and they were not significant on leg, loin and middle neck. On other hand differences due to matures weight were highly significant on shoulder, middle neck, beast end of neck and scrag, significant only on breast and not significant on leg and loin. Because the genotype (7/8D*1/8B) carcass was heavier, the carcass left side and all its wholesales cuts were heavier compared with the other three genotypes. The genotype (3/4D*1/4B) was better than genotype (1/2D*1/2B) and genotype (1/4D*3/4B), it seems that crossing Damascus with barki goats may be an option to improve carcass cuts over that of straight bred barki goats. As percentage of total side weight the differences due to genotype were not significant on expensive joints (leg and loin),while beast end of neck was higher in (1/4D*3/4B) than (7/8D*1/8B). but shoulder was equal in

(1/4D*3/4B) and (7/8D*1/8B).When weights of joints were expressed as percentages of cold left side weight the cuts (leg, loin, best end of neck and scarg) were higher in (1/4D*3/4B) than (7/8D*1/8B).The present results are disagreement with Maharem,(1990), who work on same genotype. While Oman *et al.* (2004), reported that crossing Spanish with Angora goats improve carcass characteristics.

Physical carcass composition

1-Lean tissue:

Table (4) shows that percentage of lean (lean weight/ joint weight x 100) in carcass joints and weight and percentage of lean in left side. Lean weight and percentage were heavier and higher respectively in genotype (7/8D*1/8B) than other genotypes studied, the differences between genotype (1/4D*3/4B) and genotype (7/8D*1/8B) in lean weight was 39%, while the differences between genotype (1/4D*3/4B) and genotype (1/2D*1/2B) was .08% only. Lean percentage was higher in genotype (7/8D*1/8B) followed by (3/4D*1/4B), (1/2D*1/2B) and the least percentage was in genotype (1/4D*3/4B), this may be attributed to that all individual joints were heavier weight in genotype (7/8D*1/8B) than in other genotypes. Lean percentage ranged between 61% to 65%.It seems that the increasing Damascus blood percentage resulted in improving carcass joints. The lean weight of kids slaughtered at 85% mature weight was heavier than other matures weight. Differences among mature weights were highly significant. In the most various joints Lean percentage differences were highly significant among genotypes and matures weight studied except for the lean percentage differences in loin and breast joints were insignificant. Owen, and Norman, (1977) reported that lean percentage in goat carcass is around 60%. Maharem,(1990) reported that the (1/2D*1/2B) produced leaner carcasses than (1/4D*3/4B). The present results are in agreement with Oman *et al.* (2004), who reported that in the studied on four breeds (Spanish, Boer Spanish, Spanish Angora and Angora goats), carcasses from Boer × Spanish and Spanish goats possessed higher ($P<.05$) percentages of lean and lower ($P<.05$) percentages of fat for the side than did carcasses from Spanish ×Angora and Angora goats. In general, the primal cuts from Angora carcasses were the fattest ($P<.05$) or among the fattest. When the Spanish × Angora carcasses were compared to the Angora carcasses, it seemed that the addition of the Spanish breeding tended to increase lean and decrease fatness for most side or primal com-parisons.

2-Bone :

percentage of bone in carcass joints and weight and percentage of bone in left side are shown in table(4).In the left side, weight and percentage of bone were heavier and higher respectively in genotype (7/8D*1/8B) than other genotypes, the differences between genotype (1/4D*3/4B) and genotype (7/8D*1/8B) in weight bone in left side was 27%, but the differences between genotype (1/4D*3/4B) and genotype (1/2D*1/2B) was .06% only. When bone weight and percentage in carcass side were compared highly significant ($p<0.01$) differences were found among genotypes. This was mainly because of the greater weight of bone in the genotype (7/8D*1/8B) joints and side.

T3-4

While bone percentage was higher in left side in genotype (1/4D*3/4B) followed by (1/2D*1/2B),(3/4D*1/4B) and then genotype (7/8D*1/8B). Bone percentage in left side in genotypes was around 23.78% in genotype (7/8D*1/8B) to 25.20%.in genotype (1/4D*3/4B). It is worthy to note that as matures weight increased the bone weight or bone percentage in left side increased but the differences among matures weight on bone weight were highly significant but on bone percentage were insignificant. The genotype effect on the bone percentage in (leg, shoulder and best end of neck) joints was highly significant but the bone percentage differences in Middle neck and breast joints were insignificant, while the bone percentage differences in loin and scarg were significant. On other hand the effect of matures weight on Bone percentage in various joints(leg, shoulder and loin) were highly significant but the bone percentage differences in best end of neck and breast joints were in significant, while in the bone percentage differences in middle neck and scrag were significant. Maharem,(1990) reported that percentage of total bone was very similar in the four genotypes, bone percentage did not differ in joints other than the scrag. Steinbach, (1987) reported that bone percentage in carcasses of goats of different ages and sex ranged between 22.0 and 24.0. Oman *et al.* (2004), who reported that carcasses from Boer × Spanish and Spanish goats possessed higher (P<.05) percentages of bone for the side than did carcasses from Spanish ×Angora and Angora goats.

3 -Subcutaneous fat

Table (5) shows that percentage of Subcutaneous fat (Subcutaneous fat weight/ joint weight x 100) in carcass joints and weight and percentage of Subcutaneous fat in the left side. Weight and percentage of Subcutaneous fat in left side was heavier in genotype (7/8D*1/8B) than other genotypes followed by (3/4D*1/4B), (1/2D*1/2B) and then by genotype (1/4D*3/4B), the differences among genotypes were highly significant and significant on Subcutaneous fat percentage. The Subcutaneous fat percentage was higher in genotype(1/2D*1/2B), followed by (1/4D*3/4B) and (3/4D*1/4B) and then genotype (7/8D*1/8B). The effect of genotype on Subcutaneous fat percentage in various joints (leg, loin, scrag and Brest) were insignificant but the Subcutaneous fat percentage differences in shoulder and best end of neck were significant and highly significant respectively. While the Middle neck contained negligible amount of fat. On the other hand the effect of mature weights on weight of Subcutaneous fat in left side was highly significant but on Subcutaneous fat percentage in left side was only significant, the mature weight at 85% and 65% were higher in weight and percentage respectively of Subcutaneous fat in left side than 50% mature weights. While the effect of mature weights on carcass joints leg, loin, scrag and best end of neck were insignificant but significant and highly significant on shoulder and breast, respectively. The present results disagreement with Maharem,(1990) who reported that the effect of genotypes on Subcutaneous fat percentage in left side was insignificant. Goat carcasses is known to lack the good Subcutaneous cover (Gaili ., 1976).

T5

Sumarmono, *et al.* (2001), reported that Boer goats was considerably high intramuscular fat contributed more to the carcass weight than subcutaneous fat, furthermore a partitioning between subcutaneous fat (SCF) and intramuscular fat (IMF) showed that, despite a TCF of 24.1% at 41 kg live weight, the Boer goat partitioned only 6.7% to the SCF depot.

4 -Intramuscular fat

Table (5) shows that percentage (Intramuscular fat weight/ joint weight x 100) of Intramuscular fat in various carcass joints and weight and percentage of Intramuscular fat in left side, weight of Intramuscular fat in left side was heavier in genotype (7/8D*1/8B) than other genotypes followed by (3/4D*1/4B), (1/2D*1/2B) and then genotype (1/4D*3/4B), the differences among genotypes were highly significant effect on Intramuscular fat in left side. But only significant on Intramuscular fat percentage , and was higher in genotype (1/4D*3/4B) followed by (1/2D*1/2B), (3/4D*1/4B) and then genotype (7/8D*1/8B). The difference among genotype on Intramuscular fat percentage in various joints (Breast, Scrag Loin and Leg) were insignificant and were significant in Best end of neck and Middle neck except for the difference among genotype on Intramuscular fat percentage in Shoulder were highly significant. While the effect of matures weight on various joints (Leg, Best end of neck and Breast) was insignificant but significant effect on (Middle neck, Shoulder, loin and scrag). On the other hand, the effect of matures weight on weight of Intramuscular fat and Intramuscular fat percentage in left side was insignificant. The mature weight at 85% were higher in weight and percentage of Intramuscular fat in left side than other matures weight. Maharem,(1990) reported that the in the same genotypes studied the percentage of total fat was almost equal distributed between Subcutaneous and Intramuscular depots. Oman *et al.* (2004), stated that carcasses from Spanish goats had less ($P < .05$) mean Intramuscular fat than the other breed types and when adjusted for variations in fat thickness over the carcass had less ($P < .05$) than Spanish × Angora and Angora carcasses.

5-Total fat

Genotype (7/8D*1/8B) had the heaviest weight of total fat than other genotypes followed by (3/4D*1/4B), (1/2D*1/2B) and then genotype (1/4D*3/4B). the differences among genotypes were highly significant for weight and total fat percentage in left side. Total fat percentage was higher in genotype (1/4D*3/4B) followed by (1/2D*1/2B), (3/4D*1/4B) and then genotype (7/8D*1/8B). On the other hand the effect of mature weights on weight of total fat weight was highly significant but on total fat percentage was significant only, the mature weight at 85% was higher in weight and percentage of total fat than other mature weights. Sumarmono, *et al.* (2001) reported that total body fat (TBF) in Boer goats was considerably higher (18.31%) In terms of total carcass fat (TCF), Boer goats were leaner(18.2%) Partitioning of TBF. Boer goats yielded 51.8% TCFand48.2%totalnon-carcassfat(TNCF). The present results are in agreement with Maharem,(1990), Miller *et al.* ((2000)) Oman *et al.* (2004).

The genotype and matures weight interaction was highly significant on Lean percentage in leg , shoulder and in left side. And also on Bone percentage in leg, loin. On other hand the interaction was significant on total fat weight and insignificant on total fat percentage oman *et al.* (2004) reported that, the breed-type feeding regimen interaction was not a significant source of variation (P>.05) for percentage of lean or bone for the side or any of the cuts. The interaction was a significant source of variation (P<.05) for percentage of fat for the shoulder and rack and tended toward significance (P<.10) for the side and sirloin. Although there were no significant differences between the breed

Chemical composition

Table (6) show, the percentages of protein, fat, ash, and moisture in meat of the best end of neck joint. The percentage of the moisture was slightly higher in genotype (3/4D*1/4B) than other genotypes, the differences were highly significant. While the effect of mature weights was not significant. The genotype (7/8D*1/8B) had higher protein than other genotypes, with insignificant differences between genotypes in percentages. While the mature weight had highly significant effect on protein percentages. Fat percentage was higher in genotype (3/4D*1/4B).than other genotypes, the differences between genotypes studied were significant While between matures weight the effect was highly significant. Ash percentages did not significantly differ between genotypes or among matures weight in the present study. The genotype (7/8D*1/8B) and 50% mature weight had lower percentage than other genotypes. The carcass of genotype (1/2D*1/2B) and 85% mature weight had lower protein and moisture percentages than (1/4D*3/4B), (3/4D*1/4B) and (7/8D*1/8B) crossbred goats or other matures weight studies. On other hand, the carcass of genotype (7/8D*1/8B) and 50% mature weight had lower fat and moisture percentages than other studied genotypes or mature weights. It is well known that fat contains less moisture than muscles. The present results are in agreement with Maharem,(1990), Miller *et al.* ((2000)) Oman *et al.* (2004).

Table (6) Chemical composition (%) of meat of best end of neck of the four genotypes under three matures weight

Item	Genotype (G)					% of Matures weight (S)				significant		
Component	1/4D* 3/4B	1/2D* 1/2B	3/4D* 1/4B	7/8D* 1/8B	SEM	50%	65%	85%	SEM	G	S	GS
Protein	60.26 [a]	59.25 [a]	60.11 [b]	61.94 [c]	0.91	63.09 [a]	60.31 [a]	57.78 [a]	0.79	NS	**	NS
Fat	36.22 [ab]	38.07 [a]	36.63 [ab]	34.97 [b]	0.98	33.73 [c]	36.53 [b]	38.95 [a]	0.81	*	**	NS
Ash	2.58 [a]	2.39 [a]	2.49 [a]	2.32 [a]	0.8	2.33 [a]	2.51 [a]	2.50 [a]	0.06	NS	NS	NS
Moisture	66.40 [a]	64.15 [b]	68.02 [a]	67.75 [a]	0.83	67.64 [a]	66.04 [a]	66.075 [a]	0.89	**	NS	*

Conclusion

Crossbreeding using Damascus goat resulted in heavier live and carcass weights and more heavily muscled carcasses., when goats slaughtered at 85% mature weight, they showed heavier slaughter weight, hot carcass weight, gut content weight, total offal's weight, edible offal parts weight and offal's fat weigh. Thus crossing Damascus with Barki goats may be an option to improve carcass cuts over that of straight bred Barki goats.

REFERENCES

A.O.A.C.(1970) .Official mothed of analysis. Association of official Agricultural chemists. Washington, DC.

Casey, N.H., 1982. Carcass growth characteristics of four South African sheep breeds and the Boer goat. DSc (Agric) thesis, Univ. Pretoria, Rep. S. Africa.

Casey N. H. and W. A. Van Niekerk (1988) Growth, Nutrient Requirements ,Carcass and Meat Quality Department of Livestock Science, Faculty of Agriculture, University of Pretoria 0002 Pretoria, South Africa .

FAO, (2004). FOA-STAT Home, FAO Homepage. Animal feed resources information system . (http://apps.fao.org/page/collections/subset=agriculture)

Gaili, E.S.E. (1976). Body composition of male Sudan desert goat. World Review of Animal production. Vol.12,No.4,page 83-87.

Gibb, J.J., J. E. Cook, and T. T. Tresher, 1993. Performance of British Saanen, Boer X British Saanen and Anglo-Nubian Castrated Male Kids from 8 weeks to Slaughter at 38,33 or 38 kg live weight. Anim. Prod. 57:263-271.

Miller, J C, Jones, J M and Burt, C R ((2000)) Feed lot and carcass studies of Angora wethers Bulletin Texas Agricultural Experimental Station No 63 pp 14

Maharem.G.A.M ((1990)_) Meat production and caresses characteristics of Barki, Damascus goats and their crosses under two feeding system. Theis Faculty of Agriculture, Alexandria University.

Meat and Livestock Commission (M.L.C.) (1970) .Instruction for assessment, photography, Jointing and tissue separation of lamb carcass. Meat and Livestock Commission, Bletchley, Milton Keynes.

Naude, R.T. and Hofmeyr, H.S., 1981. Meat Production. In: C. Gall (Editor), Goat Production, Chapter 9. Academic Press, London, England, pp. 285-307.

Oman, J. S. D. F. Waldron2 , D. B. Griffin, and J. W. Savell ((2004)) Effect of Breed-Type and Feeding Regimen on Goat Carcass Traits J. Anim. Sci. 77:3215–3218

Owen, J.E. and Norman, G.A., 1977. Studies on the meat production characteristics of Botswana goats and sheep. Part II. General body composition, carcass measurements and joint composition. Meat Sci., 1: 283-306.

SAS (1999). SAS User Guide, Statistics. Version 8 edition SAS Institute INC. Cary NC.

Schapera, I., 1959. The Bantu Speaking Tribes of South Africa. An ethnographical survey for the South African Inter-University Committee for African studies. Maskew Millar, Cape Town, Rep. S. Africa

Sumarmono, J. NMW Pratiwi, PJ Murray, DG Taylor (2001) Carcass composition of entire and castrated full blood improved Boer bucksJ Proceedings of the Nutrition Society of Australia. 25

Steinbach, J., 1987. Evaluation of indigenous and exotic breeds and their crosses for production in unfavorable environments. Proc. 4th Int. Conf. Goats, Brasilia, Brazil Vol I, PP.625-642.

Ueckerman, L., 1969. Produksie studies met Boer bokke. In utilization of Boer goat for intensive animal production Anim. Dairy. Sci. Res. Inst. Trene, S. Africa. Master of Science Ag. Thesis, University Pretoria, Republic of South Africa.

دراسة تأثير التركيب الوراثى و النسب المئوية المختلفة من وزن النضج على الصفات الطبيعية للذبائح وقطعيات اللحم والتركيب الكيماوي للذبيحة في الماعز الخليط

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أجريت هذه الدراسة على ٧٢ ذكر ماعز تمثل ٤ تراكيب وراثية ١٨ جدي لكل مجموعة وهى كالتالي (٤/٣برقى*٤/١دمشقى) و (٢/١دمشقى*٢/١برقى) و (٤/٣ دمشقي*٤/١برقى) و (٨/٧دمشقى*٨/١برقى) والمرباة بمزرعة بحوث الإنتاج الحيواني ببرج العرب التابعة لمعهد بحوث الإنتاج الحيواني و قد ذبحت جداء كل مجموعة على ٣ نسب من وزن النضج (٥٠% و ٦٥% و ٨٥%) بغرض دراسة تأثير التركيب الوراثى و النسب المئوية المختلفة من وزن النضج على أنتاج الذبائح والصفات الطبيعية للذبائح وقطعيان اللحم والتركيب الكيماوي للذبيحة في خلائط الماعز البرقى المحلية والدمشقي المستوردة وقد أوضحت النتائج أن التركيب الوراثى (٨/٧دمشقى*٨/١برقى) و ٨٥% من وزن النضج كانت أعلى التراكيب الو راثية و أعلى نسب النضج التي ذبح عندها الحيوان فى وزن الذبح ووزن الذبيحة ساخن ووزن محتويات القناة الهضمية والوزن الكلى للفضلات ووزن الأجراء الصالحة للأكل وكذا وزن الدهن الصالح للأكل.بينما كان التركيب الوراثى(٤/٣برقى*٤/١دمشقى) ووزن الذبح عند ٥٠% من وزن النضج كانت أقل لتلك الصفات. وكانت نسبة التصافي المحسوبة على أساس وزن الجسم حي أعلى في (٨/٧دمشقى*٨/١برقى) ثم (٤/٣برقى*٤/١دمشقى) ثم(٤/٣ دمشقي*٤/١برقى) و أخيرا التركيب الوراثى (٢/١دمشقى*٢/١برقى) بينما عندم كانت نسبة التصافي المحسوبة على أساس وزن الجسم فارغ كانت أعلى فى التركيب الوراثى (٨/٧دمشقى*٨/١برقى) ثم(٤/٣ دمشقي*٤/١برقى) ثم (٢/١دمشقى*٢/١برقى) و أخيرا التركيب الوراثى (٤/٣برقى*٤/١دمشقى). وكان وزن ونسبة اللحم الأحمر فى نصف الذبيح البارد أعلى فى التركيب الوراثى (٨/٧دمشقى*٨/١برقى) عن باقي التراكيب الو راثية المدروسة و قد تفوق التركيب الوراثى (٨/٧دمشقى*٨/١برقى) على التركيب الوراثى (٤/٣برقى*٤/١دمشقى) فى وزن اللحم الأحمر بنسبة ٣٩%. وكانت الاختلافات بين التراكيب الو راثية و نسب النضج المختلفة التي ذبح عندها الحيوانات فى نسبة العظم عالية المعنوية. وكان التركيب الوراثى (٨/٧دمشقى*٨/١برقى) أعلى التراكيب الو راثية في وزن الدهن الكلى و التركيب الوراثى (٤/٣برقى*٤/١دمشقى) أعلى التراكيب الو راثية نسبة الدهن الكلى في وزن الذبيحة.

وتشير النتائج أن بزيادة دم الدمشقي تزداد جودة ذبائح الماعز الخليطة وكذالك عند ذبح الماعز على نسبة ٨٥% من وزن النضج تتحسن صفات و جودة الذبيحة.

Table (1): Least squares means and SEM of carcass yield for different genotype and different mature weight.

Item	Genotype (G)					% of Matures weight (S)				significant		
	1/4D* 3/4B	**1/2D* 1/2B**	**3/4D* 1/4B**	**7/8D*1/ 8B**	**SEM**	**50%**	**65%**	**85%**	**SEM**	**G**	**S**	**GS**
Slaughter weight (kg)	21.92^{d}	25.00^{c}	28.62^{b}	32.32^{a}	1.49	20.60^{c}	26.67^{b}	33.62^{a}	0.83	**	**	**
Hot carcass (kg)	10.37^{d}	11.50^{c}	13.29^{b}	15.55^{a}	0.72	9.82^{c}	12.62^{b}	15.59^{a}	0.44	**	**	*
Dressing percentage Of live body weight%	47.43^{ab}	45.95^{b}	46.65^{ab}	48.29^{a}	0.75	47.61^{a}	47.13^{a}	46.50^{a}	0.67	*	NS	*
Dressing percentage Of empty body weight%	54.06^{c}	55.11^{bc}	55.91^{b}	57.35^{a}	0.44	55.46^{a}	55.73^{a}	55.64^{a}	0.46	**	NS	NS
Gut contents (kg)	2.71^{d}	4.19^{c}	4.81^{b}	5.19^{a}	0.38	2.94^{c}	4.11^{b}	5.62^{a}	0.25	**	**	*
Total offal's weight (kg)	8.68^{c}	9.81^{c}	9.90^{b}	10.93^{a}	0.47	7.67^{c}	9.51^{b}	11.77^{a}	0.24	**	**	NS
Total offal's (%)	39.83^{a}	36.54^{b}	34.87^{cb}	33.88^{c}	0.71	37.52^{a}	36.13^{ab}	35.15^{b}	0.80	**	*	NS
Edible offal parts (kg)	0.89^{b}	0.92^{b}	1.10^{a}	1.13^{a}	0.09	0.83^{c}	0.96^{b}	1.23^{a}	0.03	**	**	NS
Edible offal parts (%)	4.11^{a}	3.57^{ab}	3.90^{a}	3.45^{b}	0.10	4.06^{a}	3.67^{b}	3.68^{b}	0.15	*	*	NS
Offal's fat weight (kg)	0.73^{a}	0.73^{a}	0.74^{a}	0.88^{a}	0.05	0.58^{b}	0.81^{a}	0.89^{a}	0.05	NS	**	NS

Table (2): Least squares means and SEM of weight of joint for different genotypes and different mature weight percentage.

Item	Genotype (G)					% of Matures weight (S)				significant		
Joint weight (kg)	**1/4D* 3/4B**	**1/2D*1/ 2B**	**3/4D* 1/4B**	**7/8D* 1/8B**	**SEM**	**50%**	**65%**	**85%**	**SEM**	**G**	**S**	**GS**
Cold left side	5.283^{d}	5.740^{c}	6.630^{b}	7.820^{a}	0.35	4.923^{c}	6.330^{b}	7.850^{a}	0.28	**	**	NS
Leg	1.59^{d}	1.70^{c}	1.95^{b}	2.35^{a}	0.11	1.47^{c}	1.91^{b}	2.32^{a}	0.08	**	**	NS
Shoulder	1.103^{c}	1.143^{c}	1.367^{b}	1.648^{a}	0.07	1.012^{c}	1.262^{b}	1.665^{a}	0.08	**	**	NS
Loin	0.520^{c}	0.554^{c}	0.642^{b}	0.726^{a}	0.03	0.483^{c}	0.616^{b}	0.734^{a}	0.03	**	**	NS
Middle neck	0.790^{d}	0.908^{c}	1.017^{b}	1.186^{a}	0.07	0.696^{c}	0.977^{b}	1.252^{a}	0.06	**	**	NS
Best end of neck	0.396^{d}	0.471^{c}	0.531^{b}	0.701^{a}	0.03	0.401^{c}	0.562^{b}	0.612^{a}	0.04	**	**	NS
Scrag	0.273^{c}	0.302^{c}	0.382^{b}	0.455^{a}	0.01	0.303^{c}	0.340^{b}	0.416^{a}	0.02	**	**	*
Breast	0.497^{c}	0.551^{b}	0.658^{a}	0.662^{a}	0.04	0.462^{c}	0.556^{b}	0.758^{a}	0.04	**	**	NS

Table (3): Least squares means and SEM of percentage of joint for different genotypes and different mature weight percentage.

Item	Genotype (G)					% of Matures weight (S)				significant		
Joint (%)	1/4D* 3/4B	1/2D*1/2 B	3/4D* 1/4B	7/8D* 1/8B	SEM	50%	65%	85%	SEM	G	S	GS
Leg	30.12 ^{a}	29.56 ^{a}	29.57 ^{a}	30.03 ^{a}	0.25	29.78 ^{a}	30.08 ^{a}	29.61 ^{a}	0.26	NS	NS	NS
Shoulder	20.96 ^{a}	19.93 ^{b}	20.62 ^{ab}	20.9 ^{a} 5	0.30	20.73 ^{a}	20.00 ^{b}	21.11 ^{a}	0.25	*	**	*
Loin	9.93 ^{a}	9.68 ^{a}	9.75 ^{a}	9.33 ^{a}	0.22	9.84 ^{a}	9.797 ^{a}	9.381 ^{a}	0.18	NS	NS	NS
Middle neck	14.84 ^{a}	15.62 ^{a}	15.18 ^{a}	15.07 ^{a}	0.57	14.15 ^{b}	15.42 ^{a}	15.9 ^{a}	0.30	NS	**	NS
Best end of neck	7.50 ^{d}	8.26 ^{b}	8.08 ^{b}	8.97 ^{a}	0.27	8.07 ^{a}	8.78 ^{b}	7.75 ^{b}	0.24	**	**	NS
Scrag	7.42 ^{a}	8.26 ^{a}	8.08 ^{a}	8.97 ^{a}	0.27	8.07 ^{a}	8.78 ^{b}	7.75 ^{b}	0.24	**	**	NS
Breast	9.54 ^{a}	8.88 ^{a}	9.65 ^{a}	8.39 ^{b}	0.24	8.07 ^{a}	8.78 ^{b}	7.75 ^{a}	0.24	**	*	NS

Table (4): Least squares means and SEM of physical carcass composition (lean, and bone) and left side of carcass joint for different genotype and different mature weight.

Item	Genotype (G)					% of Matures weight (S)				significant		
	1/4D* 3/4B	1/2D* 1/2B	3/4D* 1/4B	7/8D* 1/8B	SEM	50%	65%	85%	SEM	G	S	GS
% of Lean in leg cut	67.50 ^{b}	68.58 ^{b}	70.66 ^{a}	70.47 ^{a}	0.41	68.99 ^{a}	69.70 ^{a}	69.22 ^{a}	0.51	**	**NS**	**
Lean in % o Shoulder cut	65..93 ^{b}	66.61 ^{b}	66.93 ^{b}	70.58 ^{a}	0.49	67.49 ^{a}	66.75 ^{a}	68.31 ^{a}	0.64	**	**NS**	**
Lean in loin cut % of	61.69 ^{a}	59.81 ^{a}	63.98 ^{a}	61.99 ^{a}	1.25	62.37 ^{a}	62.18 ^{a}	61.06 ^{a}	0.83	NS	**NS**	**NS**
Lean in Middle % of neck cut	60.22 ^{b}	60.86 ^{b}	63.60 ^{a}	64.83 ^{a}	1.18	63.24 ^{a}	59.93 ^{b}	63.96 ^{a}	1.19	**	**	*
% of Lean in Best end of neck cut	50.99 ^{c}	54.90 ^{b}	55.50 ^{b}	54.33 ^{a}	1.22	53.93 ^{a}	56.07 ^{a}	55.54 ^{a}	1.70	**	**NS**	*
Lean in Scrag cut % of	73.11 ^{ab}	68.73 ^{b}	72.44 ^{ab}	73.74 ^{a}	1.98	75.4 ^{a}	69.28 ^{b}	74.09 ^{ab}	1.27	*	*	**NS**
Lean in Breast f % o cut	52.89 ^{a}	56.43 ^{a}	53.95 ^{a}	56.04 ^{a}	1.62	56.23 ^{a}	57.01 ^{a}	51.25 ^{a}	0.69	NS	**NS**	**NS**
Lean weight in left side (kg)	3.245 ^{d}	3.58 ^{c}	4.252 ^{b}	5.127 ^{a}	0.21	3.141 ^{c}	4.010 ^{b}	5.008 ^{a}	0.01	**	**	**NS**
Lean in left side % of	61.48 ^{b}	62.15 ^{b}	64.26 ^{a}	65.58 ^{a}	0.46	63.43 ^{a}	63.07 ^{a}	63.60 ^{a}	0.54	**	**NS**	**
Bone in leg cut % of	25.45 ^{a}	24.28 ^{b}	23.04 ^{c}	22.73 ^{c}	0.40	24.6 ^{a}	23.46 ^{b}	23.56 ^{b}	0.50	**	**	**
% of Bone in Shoulder cut	23.64 ^{a}	23.57 ^{a}	23.03 ^{a}	20.82 ^{b}	0.58	23.27 ^{a}	23.71 ^{a}	21.32 ^{b}	0.72	**	**	*
% of Bone in loin cut	25.66 ^{a}	24.7 ^{ab}	22.55 ^{b}	24.47 ^{ab}	0.45	25.9 ^{a}	22.51 ^{b}	24.61 ^{a}	0.84	*	**	**
Bone in Middle neck % cut	30.77 ^{a}	30.38 ^{a}	28.76 ^{a}	28.69 ^{a}	1.09	29.34 ^{ab}	31.51 ^{a}	28.10 ^{b}	0.95	NS	*	*
% of Bone in Best end of neck cut	35.88 ^{a}	32.73 ^{b}	32.73 ^{b}	28.71 ^{c}	1.34	33.53 ^{a}	32.93 ^{ab}	31.07 ^{b}	1.31	**	**NS**	*
Bone in Scrag cut % of	27.32 ^{b}	30.71 ^{a}	29.48 ^{a}	27.20 ^{b}	1.40	26.24 ^{b}	30.42 ^{a}	29.37 ^{ab}	1.33	*	*	**NS**
Bone in % of Breast cut	20.96 ^{a}	22.06 ^{a}	21.37 ^{a}	21.86 ^{a}	0.79	21.84 ^{a}	19.93 ^{a}	22.89 ^{a}	1.23	NS	**NS**	**NS**
Bone weight in left side (kg)	1.354 ^{d}	1.446 ^{c}	1.62 ^{b}	1.864 ^{a}	0.08	1.23 ^{c}	1.569 ^{b}	1.915 ^{a}	0.05	**	**	**
% of Bone in left side	25.20 ^{a}	25.45 ^{ab}	24.88 ^{bc}	23.78 ^{c}	0.44	2.98 ^{a}	3.74 ^{a}	3.76 ^{a}	0.11	**	**NS**	**

Table (5): Least squares means and SEM of physical carcass composition(Subcutaneous fat, Intramuscular fat and Total fat) and left side of carcass joint for different genotype and different mature weight.

Item	Genotype (G)					% of Matures weight (S)						
	1/4D* 3/4B	1/2D* 1/2B	3/4D* 1/4B	7/8D* 1/8B	SEM	50%	65%	85%	SEM	G	S	GS
% of Subcutaneous fat in leg cut	3.44^{a}	3.53^{a}	3.04^{a}	3.02^{a}	0.17	2.98^{a}	3.741^{a}	3.76^{a}	0.11	NS	NS	*
% of Subcutaneous fat in Shoulder cut	4.52^{a}	3.67^{a}	3.68^{a}	4.11^{a}	0.36	3.78^{a}	4.28^{a}	4.35^{a}	0.32	NS	NS	*
% of Subcutaneous fat in loin cut	6.83^{a}	7.06^{a}	6.13^{a}	5.69^{a}	0.48	5.91^{a}	6.66^{a}	670^{a}	0.31	NS	NS	NS
% of Subcutaneous fat in Best end of neck cut	8.121^{a}	7.77^{ab}	5.93^{b}	7.16^{ab}	0.79	7.45^{a}	6.92^{a}	7.37^{a}	0.53	**	NS	NS
% of Subcutaneous fat in Scrag cut	3.02	3.12^{a}	2.36^{a}	2.75^{a}	0.25	3.03^{a}	2.91^{a}	2.51^{a}	0.25	NS	NS	NS
% of Subcutaneous fat in Breast cut	14.01^{a}	14.46^{a}	14.48^{a}	12.06^{a}	1.19	10.71^{b}	16.33^{a}	14.21^{a}	0.87	NS	**	*
Subcutaneous fat in left side (kg)	0.254^{b}	0.268^{b}	0.299^{b}	0.316^{a}	0.02	0.196^{c}	0.298^{b}	0.359^{a}	0.02	**	**	**
% of Subcutaneous fat in left side	4.742^{a}	4.75^{a}	4.44^{ab}	3.99^{b}	0.22	4.20^{b}	4.74^{a}	4.60^{a}	0.11	*	*	**
% of Intramuscular fat in leg cut	3.12^{a}	3.30^{a}	3.30^{a}	2.93^{a}	0.21	2.98^{a}	3.13^{a}	3.34^{a}	0.16	NS	NS	**
% of Intramuscular fat in Shoulder cut	7.36^{a}	7.07^{ab}	6.01^{ab}	7.73^{b}	0.24	4.83^{b}	5.22^{ab}	5.60^{a}	0.30	**	*	NS
% of Intramuscular fat in loin cut	5.99^{a}	7.57^{a}	6.29^{a}	5.63^{a}	0.70	5.12^{b}	7.1^{a}	6.84^{a}	0.61	NS	*	NS
% of Intramuscular fat in Middle neck cut	8.43^{a}	7.99^{a}	7.11^{ab}	6.25^{b}	0.51	6.74^{b}	8.1^{a}	7.47^{ab}	0.61	*	*	NS
% of Intramuscular fat in Best end of neck cut	5.01^{a}	3.95^{ab}	3.50^{b}	4.71^{ab}	0.44	4.67^{a}	3.98^{a}	4.23^{a}	0.34	*	NS	NS
% of Intramuscular fat in Scrag cut	3.06^{a}	2.98^{a}	2.32^{a}	2.70^{a}	0.40	2.76^{ab}	3.23^{a}	2.31^{b}	0.37	NS	*	*
% of Intramuscular fat in Breast cut	11.62^{a}	11.78^{a}	9.06^{a}	9.47^{a}	1.33	10.63^{a}	10.16^{a}	11.24^{a}	1.04	NS	NS	NS
Intramuscular fat in left side (kg)	0.300^{b}	0.322^{b}	0.338^{b}	0.381^{a}	0.02	0.240^{c}	0.336^{b}	0.429^{a}	0.02	**	*	NS
% of Intramuscular fat in left side	5.630^{a}	5.60^{a}	5.06^{b}	4.86^{b}	0.12	4.96^{a}	5.35^{a}	5.52^{a}	0.22	*	NS	NS
Total fat in left side (kg)	0.621^{b}	0.640^{b}	0.689^{b}	0.788^{a}	0.04	0.487^{c}	0.690^{b}	0.877^{a}	0.04	**	**	*
% of Total fat in left side	$11..64^{a}$	11.21^{ab}	10.21^{bc}	10.01^{c}	0.36	10.0^{b}	10.97^{ab}	11.27^{a}	0.43	**	*	NS