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EFFECT OF SELECTION SIRES ON GROWTH PERFORMANCE AND CARCASS TRAIS OF BARKI LAMBS.

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ABSTRACT

This study was initiated to determine the production advantage of selected on-farm growth performance rams mated to Barki breeding ewes. Breeding rams selection was based on a combination of growth data and visual appraisal of muscling. Twenty-five Barki rams, representing high (H) and moderate (M) growth performance were randomly assigned to mate 180 Barki breeding ewes through out three successive breeding seasons. Data collected during this study included; ewe lambing rate, pre- and post-weaning lamb growth performance and lamb carcass merit. Results indicated that, no significant differences (P≤ .05) were found among the selected rams (H & M) on lambing rate, birth weight, weaning weight, pre weaning average daily gain and yearling weight. Meanwhile, there were a significant differences in post weaning average daily gain among progeny sired by H rams and those sired by M rams, estimated as 12% increase in favor of H rams (86.04 gm vs. 76.75 gm), respectively. The current results demonstrated a small difference (9.25 gm/day) but economically important advantage of lambs sired by H rams compared to lambs sired by M rams. Accordingly, each marketed lamb sired by H rams will earn more revenues of approximately LE 115 than the marketed lamb sired by M rams. No significant differences (P≤ .05) were observed among carcass merit of progeny sired by H or M rams. Results concluded that ram selection based on a combination of pre- and post weaning growth performance can be used to adequately identify superior sires, as well as, using sire with superior growth traits in a commercial sheep enterprise can greatly increase lamb growth efficiency.

Keywords: Barki lambs.sire selection. growth performance, carcass merit.

INTRODUCTION

Animal performance is a product of genetics and environment (Kooharie et al 2002). Genetic improvement through the selection of rams for rapid pre and post weaning average daily gain (since it is the measurable indicator of growth) may be a key resource producers need to meet the economic challenges in lamb production systems.numerous studies have reported that sire breed can affect meat fatty acid profile (Zombayashi *et al.,* 1995). Rams are half of the genetics of a flock. An individual ram will be mated to many ewes, making the selection of a ram particularly important. A new ram will significantly influence lamb crop and therefore revenues. Usually, producers are concerned about genetics because they particularly like the high performance of an animal to be able to repeat that performance in the flock. Therefore, without positive selection pressure for economically trait (growth), rams may be added which reduce growth performance. Differences in rate of gain due to sire may also be an important factor in a lambs ability to gain. If there are important differences in rate of gain between sire progeny groups, then it worthwhile to select sires which had a high rate

of gain as lambs and/or which have been progeny tested and found to be superior genetic merit for this trait. The economic impact which average daily gain has on flock profitability has yet to be fully realized. The current study was launched to determine the production advantage for growth traits and carcass merit of Barki lambs sired by rams selected for rapid pre- and post-weaning daily gain compared to rams selected for moderate growth rate.

MATERIALS AND METHODS

The present study was carried out over three successive breeding seasons utilizing data of a breeding flock of Barki sheep raised under semi-intensive production system at Maryout Research Station, belonging to Desert Research Center. This station is located in North Western Coast of Egypt, 180 km from Cairo.

Experimental procedures

Rams selection

The ranking tool for ram's selection criteria was a combined index based on a composite of pre and post weaning growth performance and subjective visual appraisal for muscling. Pre-weaning growth data of rams used as sires were adjusted for age of dam, type of lamb birth High (H) growth performance rams were selected from the top 20% ranked rams and moderate (M) growth performance rams from at or near the midpoint of the performance rank. Subjective muscling scores were used to select within performance category. In the H rams, more muscle shape was favored, less muscle shape when selecting the M rams. In both cases, rams were judged visually acceptable to commercial ram buyers. A total number of 25 pure Barki breeding rams were selected to join three successive breeding seasons of the current study. Growth performance of the selected rams used to sire progeny is shown in Table 1. The least squares means of post-weaning average daily gain (ADG2) for high rams was estimated as 80 gm compared to 53 gm for moderate rams.

Table 1. The growth performance of the selected breeding rams.

Traits	High	Moderate	Overall
Birth weight, kg	4.23 ± 0.37	3.58 ± 0.16	3.77 ± 0.162
Weaning Weight, kg	21.5^{a} ± 1.40	16.12^{b} ± 1.19	17.69 ± 1.05
Yearling weight, kg	43.81^{a} ± 0.84	31.81^{b} ± 1.45	35.12 ± 1.5
Pre-weaning daily gain (ADG1), gm	191^{a} ± 0.014	140^{b} ± 0.012	155 ± 0.01
Post-weaning daily gain (ADG2), gm	80^{a} ± 0.027	53^{b} ± 0.004	60 ± 0.004
General daily gain (ADG3), gm	107^{a} ± 0.002	77^{b} ± 0.004	86 ± 0.004

ADG1; average daily gain from birth to weaning, ADG2; average daily gain from weaning to yearling, ADG3; average daily gain from birth to yearling. a,b; means within raw with different superscripts are significantly different (P ≤ 0.05).

Breeding seasons

A total number of 180 breeding ewes were naturally mated once a year at autumn season from 15th September and the breeding season lasted for 34 days. Flushing took place two weeks before breeding season. Breeding ewes were homogeneity distributed in mating groups in breeding pens (20 – 25 ewes) according to their ages and were assigned randomly

with one of the selected breeding rams. Rams' briskets were colored with different colored grease fortnightly and breeding pens were checked daily for colored ewes. The flock was kept under similar regular feeding regime due to management program and physiological status of the ewes throughout the three successive breeding seasons. Sheep were fed on a concentrate feed mixture consisted of undecorticated cotton seed cake 50%, wheat bran 18%, yellow maize 15%, rice polish 11%, molasses 3%, limestone 2% and common salt 1%. Half to one kg of concentrate feed mixture was offered daily per ewe according to their physiological status in addition to 0.5 kg of berseem hay (*Trifolium alexandrinum).* Whenever available the flock was allowed to graze alfalfa in neighboring areas from sunrise until before sunset for about seven hours per day. Based on animals grazing green forages directly from pasture at least for the first growing period (0-10 month) (Cifuni *et al.,* 2004). Ewes were supplemented daily with whole barley grains (0.5 kg/head). Sheep were allowed to drink clean and fresh water twice daily. Reproductive data of ewes were collected during the experimental period

Lambs Growth criteria

The progeny of the three studied breeding seasons totaled 536 lambs. Newborn lambs were weighed at birth and biweekly and/or monthly thereafter up to yearling age (365 days). Lambs were reared with their dams and weaned at age of 90 days. After weaning, each animal was kept in an individually designed independent shed (120 cm width X 150 cm length X 135 cm height) with a dedicated place for feeding. The lambs were individually fed and levels of feeds were calculated according to Kearl (1982) to cover nutritional requirements. The quantity of feeds was adjusted every 15 days according to their live body weight. Growth performance records of lambs were kept through out the three successive breeding seasons from birth to slaughter age.

Slaughtering procedures

A total number of 139 Barki ram lambs were used to obtain slaughter data for carcass merit. Lambs were randomly selected for slaughtering at yearling age. Lambs were slaughtered in the slaughter and meat-processing unit at Maryout Research Station to evaluate their carcass characteristics. Lambs were fasted for approximately 18 h before slaughtering. After slaughter and bleeding, carcasses were skinned and eviscerated before weighing. Empty body weights were recorded post-slaughter, and then all carcasses were chilled at an average temperature of 4^{o} C for 24 h to evaluate cold carcass weight (Frild *et al.* 1963). Carcass data were collected. The 9-10-11 rib cut was separated into its physical components (lean meat, fat and bone), which were expressed as percentages of the weight of the whole rib cut and Carcass weight, carcass lean weight (muscle yield), carcass fat weight (leanness) and muscularity mm (carcass shape).

D. Statistical Analysis

Data were adjusted and analyzed by least squares analysis of variance using the General Linear Model procedure described by SAS (2004). Total variance was portioned into parts attributed to non-genetic source of variance assumed to influence each trait Two statistical models were established. In the model (1) factors included in the model thought to

exert an effect on growth performance of lambs were, year of birth, of sire, sex and the ranking of rams. Interactions among these factors were also considered.

$$Y_{ijkd} = \mu + a_i + b_j + r_d + (rb)_{dj} + e_{ijkd}$$ **Model (1)**

Where:
Y_{ijk} = the observations,
μ = the overall mean,
a_i = the effect due to i^{th} age of sire, $I =$ 1.5 to 4.5 years,
b_j = the effect due to j^{th} year of birth, $J =$ 1,2 ,3,
r_d = the effect due to d^{th} ranking of rams, $d = H, M.$
$(rb)_{dj}$ = the effect due to the interaction between ranking of rams and year of breeding,
e_{ijkd} = random error associated with the $_{ijkd}^{th}$ observation.

In model (2), data were subjected to one way analysis of variance to study the statistical significant difference among some carcass traits of ram lambs sired by ranked breeding rams.

$$Y_{ij} = \mu + r_i + e_{ij}$$ **Model (2)**

Where:
Y_{ij} = the observation of carcass traits,
μ = the overall mean,
r_i = the effect due to i^{th} ranked rams, I = H, M
e_{ij} = random error associated with the $_{ijk}^{th}$ observation. The significant differences between means of the studied lambs sired by ranked rams were tested according to Duncan's New Multiple Ranges Test (Duncan, 1955).

RESULTS AND DISCUSSION

Growth performance

Least squares means and standard errors of growth performance of lambs sired by selected rams, as well as, reproductive performance of ewes mated to high (H) and moderate (M) growth performance breeding rams are presented in Table 2. Results illustrated that estimates of lamb birth weight, weaning weight and pre-weaning average daily gain of the progeny of high performance rams exceeded the growth traits of the progeny sired by moderate performance rams, but the differences were not statistically significant ($P \leq .05$), and the estimates were nearly similar (3.81 kg, 19.95 kg, 178.3 gm vs. 3.82 kg, 20.7 kg and 183.9gm), respectively. These results are in agreement with those estimated by Jeff et al. (1997) and Schwulst et al. (1996), they reported that, no statistically effect of sire rank on weaning weight and pre-weaning average daily gain. This may be due to that pre-weaning growth differences among lambs are expected to be more reflective of maternal effects, such as milk production (mothering ability), than sire effects.

Table 2. The growth performance for the progeny sired by selected breeding rams.

Traits	Overall	High	Moderate
Birth weight, kg	3.81 ± 0.049	3.82 ± 0.061	3.81± 0.079
Weaning Weight, kg	20.17± 0.32	19.95 ± 0.37	20.7± 0.62
Pre average daily gain (ADG1), gm	179.91 ± 3.43	178.3 ± 4.07	183.9 ± 6.66
Post average daily gain (ADG2), gm	83.28 ± 1.70	86.04 ± 2.80a	76.75 ± 2.06b
Total average daily gain (ADG3), gm	107.12± 1.45	108.75± 1.71b	103.31±2.67
Yearling weight, kg	43 ±0.54	43.54 ± 0.62	41.85 ± 1.03
Lambing rate	0.68 ± 0.02	0.72± 0.05	0.67 ± 0.02

ADG1; average daily gain from birth to weaning, ADG2; average daily gain from weaning to yearling, ADG3; average daily gain from birth to yearling.

On the other hand, results revealed that, there is a wide variation in post-weaning average daily gain (ADG2), as well as, total average daily gain (ADG3) between lambs in favor of rams ranked by high average daily gain (H) than that lambs sired by rams ranked of moderate average daily gain (M). The estimated differences were 86.04 gm and 108.75 gm vs. 76.75 and 103.31gm, respectively and the difference was significant ($P \leq .05$). It is clear that differences in post weaning performance would most accurately reflect the genetic contribution from the sire. These results are in agreement with Waldron *et al.* (1990) and Schwulst *et al.* (1996), the authors reported that, progeny of high ranking central tested rams had 9 % improved post-weaning gain compared to progeny from the low ranking rams. In this context, Hopkins *et al.,* (2007) reported that, selected sire as on the basis of Australian sheep breeding values for post weaning weight, depth of loin muscle and depth of subcutaneous fat had an effect on the growth rate of lambs in all treatments with a coefficient of 1.67 ± 0.52. The author added that live weight increased by 0.14 ± 0.05 kg for each unit increase in sire for post weaning weight and decreased by 0.55 ± 0.20 kg for a unit increase in sire ASBV for depth of lion muscle.

In contrast, yearling weight was not affected by sire ranking and scored 43.54 kg and 41.85 kg in favor of rams ranked for high average daily gain than rams ranked for moderate average daily gain but the difference was not significant.

Reproductive performance (lambing rate) of ewes mated to these ranked rams is shown in Table 2. Results indicated that lambing rate was relatively close between ewes mated to rams selected for H and M growth performance (0.72 vs. 0.67), respectively. This result is in agreement with Schwulst *et al.* (1996), they reported no significant difference in reproductive performance of ewe when mated to high or low ranking rams.

Revenues comparison

The current results demonstrated that, there were differences among progeny sired by ranked rams for (H) and (M) average daily gain during the period from weaning age till yearling age, this difference estimated as 9.25gm per day in favor of H rams. This means that the progeny of H rams will achieve a heavier live body weight than progeny of M rams by about 2.54 kg at yearling age. In this context, from the economic point of view, comparing the monetary outcome generated from both ranked rams (H & M), lambs

sired by H ranked rams will reached heavier marketed weight by approximately 12 % than lambs sired by M rams. In some cases, producers marketing their lambs at a certain weight and due to higher daily gain, lambs achieved finishing weight faster than the corresponding lambs, this lead to reduce the feeding costs consequently, earned more profit. Result of the current study showed that an increase in post weaning growth rate of 9.25gm /day translates into nearly extra 2.54 kg of lamb weight, so based on this finding, each marketed lamb sired by H rams will earn more revenues of approximately LE 115 than the marketed lamb sired by M rams.

Carcass merit

Least squares means and standard errors for carcass characteristics for the progeny sired by H and M growth performance rams are given in Table 3. The studied parameters were comparable among all slaughtered lambs. Results indicated that, no advantage was observed among the carcasses of lambs sired by high or low rams on base of average daily gain. Meanwhile, no significant different were found among all measures of carcass traits for the ranked sires. These findings are in agreement with Jeff *et al.* (1997) who reported that no differences for any measures of carcass merit were significant for sire type.

Table3: least squares means and standard errors for some carcass traits (kg) of lambs sired by ranked rams.

Ranked sires	Carcass merit			
	SW	RBW	LMW	FW
Overall means	43.01±0.65	0.934±0.02	0.486±0.012	0.232±0.008
High rams	42.6±1.4	0.915±0.64	0.482±0.03	0.235±0.009
Moderate rams	43.1±0.7	0.939±0.03	0.487±0.01	0.235±0.009

SW; slaughter weight, RBW; rib weight, LMW; lean meat weight (muscle yield), FW; fat weight (leanness).

Conclusion

The current results concluded that, rams selection based on a combination of pre- and post weaning growth performance can be used to adequately identify superior sires, as well as, using sire with superior growth traits in a commercial sheep enterprise can greatly increase lamb growth efficiency and profits. In practice, sheep producers could benefit the most by mating breeding ewes to rams selected from the top ranking growth performance rams to develop sheep production.

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تأثير إنتخاب الأباء على أداء النمو وصفات الذبيحة فى الحملان البرقى

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أجريت هذة الدراسة بهدف تحديد الميزة الانتاجية لإنتخاب الكباش للتربية التى تستخدم فى تلقيح النعاج البرقى على اساس ادائها الإنتاجى. تمت دراسة خصائص التمو والذبيحة لعدد (٥٣٦) حولى من نسل ٢٥ كبش تربية. تم اختيار كباش التربية على اساس معدلات النمو الخاصة بها وكذلك الشكل الظاهرى للعضلات. تم تصنيف كباش التربية المنتخبة إلى: كباش ذات معدل نمو عالى وكباش ذات معدل نمو متوسط. تم إستخدام تلك الكباش فى تلقيح عدد ١٨٠ نعجة برقى لمدة ثلاث مواسم تربية متتالية. تم تسجيل البيانا ت والمعلومات الخاصة بالكفاءة التناسلية للاناث من حيث معدل الولادات وكذلك بيانات النسل الناتج من حيث: وزن الميلاد، وزن الفطام، معدل النمو اليومى من الميلاد وحتى الفطام، معدل النمو اليومى من الفطام وحتى عمر سنة، الوزن عند عمر سنة وكذلك بعض صفات الذبيحة: وزن الذبح، وزن اللحم الاحمر، وزن الدهن وكذلك وزن قطعية الضلوع. وقد اشارت النتائج الى عدم وجود تأثير معنوى للكباش المنتخبة على اساس معدل النمو ، وصفات النمو للنسل الناتج (وزن الميلاد، وزن الفطام، معدل النمو اليومى من الميلاد وحتى عمر الفطام وكذلك على الوزن عند عمر سنة). فى حين كان تأثير الكباش المنتخبة على اساس معدل النمو اليومى معنوى على معدل النمو اليومى من الفطام وحتى عمر سنة، حيث ارتفع معل النمو اليومى للنسل الناتج من الكباش ذات معدل النمو العالى عن تلك المولودة من الكباش ذات معدل النمو المتوسط وبلغت الزيادة حوالى ١٢ % (86.04 جم - 76.75 جم) على التوالى. اثبتت الدراسة ان هناك ميزة اقتصادية لانتخاب الكباش على اساس معدل النمو حيث حقق النسل الناتج من الكباش ذات النمو العالى معدل إيرادات أعلى من تلك المولود من الكباش ذات معدل النمو المتوسط بنحو ١١٠ جنية لكل حولى عند عمر سنة.

قام بتحكيم البحث

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