

## THE RELATIONSHIP OF PLASMA SOMATOMEDIN (IGF-1) WITH PERFORMANCE AND CARCASS CHARACTERISTICS OF AWASSI AND KARADI LAMBS

Khalil A. D. Oray

Dept. Animal Production, College of Agricultural Engineering Sciences, University of Duhok, Kurdistan Region-Iraq ([Khalil.oray@uod.ac](mailto:Khalil.oray@uod.ac))

### ABSTRACT

Lambs' performance and some carcass traits in relation to insulin-like growth factor-1 (IGF-1) were studied in twelve lambs from each of Awassi and Karadi slaughtered at three different weights raised at the animal farm, Department of Animal Production, College of Agricultural Engineering Science, University of Duhok. Each group of lambs slaughtered at 30 kg, 40 kg, and 50kg was kept in an individual separate pen and fed concentrate ration *at libitum*. Weight gain and feed intake were recorded till the slaughter and blood samples were taken at the beginning of the experiment and one day before slaughter from the vena jugular for the IGF-1 analysis by using the enzyme immunoassay (EIA) method. Statistical analysis showed that the concentrations of insulin-like growth factor (IGF-1) were not affected significantly by breed. Furthermore, lambs slaughtered at 50 kg, showed numerically the highest IGF-1 concentration, compared to lambs slaughtered at 30 kg and 40kg. There was a significant positive correlation between IGF-1 concentrations and each of the average daily gain and daily feed intake of Awassi lambs slaughtered at 30. Additionally, no consistent results were found between the IGF-1 concentration and carcass composition in studied breeds.

Key word: Somatomedin, IGF-1, lambs performance, Awassi, Karadi

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علاقة هرمون عامل النمو الشبيه بالانسولين IGF-1 بأداء وصفات الذبيحة للحملان العواسية والكرادية

خليل عبد القادر درويش أوري

مدرس

قسم الانتاج الحيواني، كلية علوم الهندسة الزراعية، جامعة دهوك

المستخلص:

تم دراسة العلاقة بين اداء الحملان وبعض صفات الذبيحة وعامل النمو الشبيه بالانسولين IGF-1 ل 12 حمل لكل من العواسي والكرادي المرباة في الحقل الحيواني لقسم الانتاج الحيواني / كلية علوم الهندسة الزراعية / جامعة دهوك . تم تربية الحملان بصورة فردية وذبحت عند اوزان 30 و 40 و 50 كغم، وغذيت على العليقة المركزة وبصورة حرة . تم تسجيل معدل الزيادة الوزنية وكمية العلف المتناول، كما تم أخذ ثلاث عينات من الدم من كل حيوان لدى بدء التجربة وقبل الذبح وبفاصل زمني نصف ساعة بين عينة وأخرى. أشارت النتائج بأن تركيز IGF-1 لم يختلف معنويًا بين السلالتين قيد الدراسة . كما تبين بارتفاع مستوى IGF-1 في الحملان المذبوحة عند وزن 50 كغم مقارنة بالحملان المذبوحة عند وزن 30 و 40 كغم. كما أظهرت النتائج بوجود علاقة معنوية بين تركيز IGF-1 وكل من معدل الزيادة الوزنية والعلف المتناول للحملان العواسية المذبوحة بوزن 30 كغم.

الكلمات المفتاحية: سوماتوميدين، وعامل النمو الشبيه بالانسولين، اداء الحملان، عواسي،كرادي

## INTRODUCTION

Small ruminant animals represent an important role in Iraq and have intrinsic value for the food security of rural population. Awassi and Karadi sheep which comprise around 60 and 20% respectively of total population in Iraq are raised mainly for meat then for milk and wool production (1) Lambs growth rate interact with many factors including breed, nutrition, sex, body condition score, hormonal control and environmental condition (5). The biological processes responsible for expressing the genetic potential for growth of meat-producing animals are not entirely understood. Animals that grew faster and slaughter at lower weight and feed to proper composition appear to utilize nutrients (protein and energy) more efficiently and to partition metabolites into muscle and adipose tissue differently than slower growing animals and slaughter at heavier weight (2, 3, 6, 25, 26,27). It is known that IGF-1 is secreted in non-pulsatile fashion and involved in the growth and function of almost every organ in the body (13). The predominant physiological impact of IGF-1 is the inducement of postnatal body growth. Also, IGF-1 can regulate the production of whole body protein, the uptake of glucose by peripheral tissues and the regulation of lipid metabolism (8). Furthermore, many aspects of nutrient utilization and partitioning in ruminant animals are regulated by the endocrine system, with GH, IGF-1, and insulin having primary roles (21, 22, 6 ). However, the precise role of each hormone in controlling growth is not known and more information is needed before the hormonal status of meat-producing animals can be manipulated to stimulate more efficient growth (7, 10). Wylie et al .(24) found that, in Suffolk and Texel-sired rams, and ewe lambs , mean serum IGF-1 concentration was significantly and positively correlated with growth rate over the period between 8 and 20 weeks of age. Additionally, there were a significant difference between Suffolk and Texel- sired rams. Also,in cattle, Ropke et al. (18) found that plasma concentration of IGF-1was correlated better with growth rate patterns than did growth hormone. In addition, IGF-1 concentration can be linked to body condition score: lower in animals with extremely higher or low body

condition scores compared with those of intermediate score (14). Therefore, the present study was conducted to investigate the relationship of growth performance and carcass traits to IGF-1 in Awassi and Karadi lambs slaughtered at different weights.

## MATERIALS AND METHODS

Twelve weaned (120 days) entire male lambs of each Awassi and Karadi with an average live weight of ( $22.46 \pm 0.26$ kg) and ( $22.02 \pm 0.22$ kg) respectively, raised at the animal farm of the College of Agricultural Engineering Sciences, University of Duhok were used. Each breed was subdivided into three groups to be slaughtered at 30, 40 and 50 kg. All lambs were individually penned and fed a concentrate *ad lib*. The refusal was collected and weighed on the next day before morning feeding. Clean water and mineral blocks were available constantly. Live weight gains for each lamb were determined for the period between initial weight and at slaughter. Animals were slaughtered when each individual lamb reached its designated body weight. Feed was withdrawal overnight and lambs were slaughtered according to Muslim (Halal) way by severing the throat and major blood vessels in the neck. After chilling the carcass at 4° C for 24 h, cold carcass was weighed and in order to determine carcass composition right half was separated physically into lean fat and bone. Pre slaughter, blood samples were obtained via indwelling jugular vein cannulas. Sampling consisted of three basal samples taken at 30-min intervals over 60 min. Blood samples were kept at room temperature for one hour, then the samples were centrifuged at 5000 rpm and then all samples were stored frozen at -20 C till the IGF-1 assay. IGF-1 concentrations were determined in the blood serum using a commercial ELISA kit (IGF-1 600 ELISA; DRG Instruments, GmbH, Germany) The collected data were submitted to SPSS software (18). ANCOVA analysis was performed to illustrate the effect of breed, slaughter weight and IGF1 (as covariate) on the final value of (IGF1). Also, the spermann correlation was performed to compute the correlation coefficients between studied characteristics, because the obtained data of

both initial IGF1 and slaughter IGF1 were non-normally distributed.

## RESULTS AND DISCUSSION

The overall mean of IGF-1 concentration of Awassi and Karadi lambs was  $97.7 \pm 3.29$  ng/ml and  $129.16 \pm 22.5$  ng/ml, respectively, and the difference between them lacked significance (Table 1). Similar results have been indicated by Brkawi et al (5) who noticed that the concentration of IGF-1 between Rahmani and Ossimi breeds was almost similar with no significant differences. A similar trend on the impact of genetic differences between breeds on IGF-1 was studied by Medrano and Bradford (12) who found a non-significant breed dependent differences in IGF-1 concentration between lines of study. Although the lambs that slaughtered at 50 kg, had recorded the highest IGF-1 concentration,  $127.82$  ng/ml and  $175.19$  ng/ml for Awassi and Karadi lambs respectively, compared to lambs slaughtered at 30 kg ( $86.26$  vs.  $112.9$  ng/ml) and 40kg ( $69.49$  vs.  $110.38$  ng/ml) but the differences were not

significant. The decline of the IGF-1 concentration of lambs slaughtered at 40 may be due to the heat stress imposed to lambs prior to slaughter compared to lambs slaughtered at 50kg which entered mild weather because of prolonged fattening period. This result is supported by the study of Sarko et al, (19) who found that IGF-1 concentration in farm animals was significantly affected by environmental factors. Also, Richard et al. (16) reported a negative correlation between environmental temperature and IGF-1 concentration. Also, Squires (21) found that short-term stress resulted in a decline of IGF-1 secretion. Similar result have been reported by, Brkawi et al (4) who demonstrated that slaughtering lambs at 360 days of age (46kg) resulted in a higher concentration of IGF-1 than did lambs slaughtered at younger age (270 days). The noticeable increase in concentration of IGF-1 in aged and heavier lambs is due to approaching adulthood of lambs (9, 15).

**Table 1. Analyses of covariance for the effected both breed and slaughter weight on IGF-1**

Breeds	IGF1 ng\mg				Significant	
	Overall all mean of breed	30kg	40kg	50 kg	Breed	weight
Awassi	$97.9 \pm 3.29$	$86.26 \pm 0.74$	$69.49 \pm 0.58$	$127.82 \pm 1.85$	ns	ns
karadi	$129.16 \pm 22.5$	$112.9 \pm 0.70$	$110.38 \pm 6.6$	$175.19 \pm 8.59$	ns	ns

ns= nonsignificant difference at 0.05 level

There was a significant positive correlation between IGF-1 concentrations and average daily gain in Awassi lambs slaughtered at 30 and a numerically positive correlation in lambs slaughtered at 50kg (Table .2). However, our results are in agreement with those reported by Mears (11) and Roberts et al. (17) who indicated that IGF-1 concentration is positively correlated with weight gain of lambs. However, there was a significant negative correlation between concentration of IGF-1 and weight gain of Awassi and Karadi lambs slaughtered at 40kg of weight possibly due to the impact of heat stress in both IGF-1 and growth of lambs. However, no reason could be offered this results and could be due to limited number of observation and further

studies is required to clarify the point. The concentration of IGF-1 obtained of Awassi lambs at slaughtered at 30kg is significantly and positively correlated with daily feed intake but not in lambs slaughtered at 40kg and 50 kg of Awassi lambs and Karadi lambs slaughtered at 30kg. The correlation estimated of IGF-1 concentration to lean fat and bone of karadi and Awassi lambs slaughtered at 30kg, 40kg and 50 kg was ranged from positive to negative; and from low to moderate and also, to high value with significant and nonsignificant effect. Such fluctuations in correlation may be due to the small sample size (small replication). And further studies are needed to clarify such relationship

**Table 2. Correlation coefficients between IGF1 with studied characteristics within breed and slaughter weight.**

		Slaughter weight (kg)	ADG	Daily feed intake	Lean	Fat	Bone	Initial IGF1
<b>Slaughter IGF1</b>	<b>Awassi</b>	30	0.73*	0.92*	-0.38	0.62*	0.1*	-0.13
		40	-0.85*	0.29	-0.40	0.79*	0.63*	-0.33
		50	0.57	0.23	-0.78*	0.83	-0.51	-0.83
	<b>Karadi</b>	30	-0.51	0.49	-0.05	-0.45	0.48	0.35
		40	-0.69*	-0.19	-0.20	-0.02	-0.01	0.24
		50	-0.27	-0.32	0.79*	0.76*	0.10	0.09

\*= significant difference at 0.05 level

It can be concluded from this results that breed differences in IGF-1 concentration is negligible and further studies with greater number of animals is required to establish the relationship of IGF-1 to performance and carcass traits of studied breeds.

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