



## PERFORMANCE OF NATIVE GOATS IN KURDISTAN REGION OF IRAQ: A REVIEW

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### ABSTRACT

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Two breeds of goats are native to Kurdistan region- Iraq, namely mountainous black goat is raised mainly for meat and milk production, and Meriz which is raised primarily for hair beside meat and milk. The two breeds were exposed over a long period of time to the vigorous and sever semi-dry conditions, drought, feed shortage and prevailing diseases. Hence their adaptation to such conditions was at the expense of important economic traits. From the limited work available for both breeds, it seems that Meriz characterized by smaller size than did black goat, and daily gain in weight is rather low for the two breeds being 0.068-0.140 kg. it seems that black goat in particular have a potential for improvement of milk yield because display over whelming range (127-189 L.). In general, fertility and prolificacy are rather low in black goat and an improvement of the reproductive performance was achieved by hormonal treatment and /or flushing and studies on semen traits revealed that bucks are seasonal breeders especially in Meriz. However, the two breeds are not well characterized and much work is needed to explore the potential of those breeds for economic traits.

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## INTRODUCTION

Goats with a world population of one billion head (FAO, 2018) are considered one of the widest spread domesticated livestock species both in its distribution and its utilization due to their adaptability to diverse environmental conditions and scarcity of feed resources (Kadim and Mahgoub, 2012). Also in Iraq, the goats with a population of 1.5 million (FAO, 2014) are considered an important livestock and two breeds are native to the region, namely mountainous black goats which is raised mainly for meat and milk and Meriz goat which utilized primarily for hair beside meat and milk (Alkass and Juma, 2005). However, unlike dairy cattle and sheep, very limited work has been attempted, to investigate the various performances and economic traits of the local goat in the region. The present study was prepared to provide some basic information on the local goat raised in the Kurdistan region - Iraq. Such information is of importance to researchers, goat breeders, conservationist of animal genetic resources, and students of animal production.

### Weight at different ages

The growth of kids from birth to age at marketing or replacement is a feature of great economic importance and needs special attention to increase the overall productivity of goats (Hermiz *et al.*, 2009). Weights at birth, weaning and 6 months

old are presented in Table (1) and weights at different ages are given in Table (2). However, it seems from the table that the weight of the kids of black goats surpasses that of Meriz kids. It is well documented that such variation could be due to breed differences, and other factors such as sex, type of birth, age and weight of the dam and season at kidding.

Table (1): Weights at birth, weaning and 6-month-old.

Traits	Male			Female		Reference
	Breed	No.	Wt. kg	No.	Wt. kg	
Birth weight kg	Meriz	53	2.26	51	2.04	Taher, (2017)
	Goat	243	2.73	226	2.57	Baper, (2020)
	Goat M+F	33	3.00	-	-	Alkass <i>et al.</i> , (2013)
	Meriz M+F	46	2.66	-	-	
Weaning weight kg	Meriz	38	12.08	37	10.28	Taher, (2017)
	Meriz	37	14.53	47	11.98	Al-Barzinji, (2012)
	Goat	191	14.96	203	14.00	Baper, (2020)
At 6-month-old kg	Meriz	38	16.28	37	16.09	Taher, (2017)
	Goat	160	25.31	195	23.47	Baper, (2020)

M+F: Male + Female

Table (2): Body weights of goats and Meriz at different ages.

Black goat		Meriz	
Age /year	Body weight kg	Age /year	Body weight kg
2.5	36.97	1	19.0±0.53
3.5	44.29	≤ 2	25.6±1.23
4.5	46.19	3	28.4±1.25
≥ 5.5	50.29	4	31.4±1.67
-	-	≥ 5	36.1±1.36
Baper, (2023)		Aziz, (2009)	

To study the relationship between placental traits and birth weight of kids, a total of 79 fetal placental samples were collected from black goats (n= 33) and Meriz (n= 40) were utilized. Results revealed that neither breed nor sex had a significant effect on all placental traits. A positive correlation was found between the birth weight of kids and each of placental efficiency, placental weight, and cotyledon weights and a non-significant negative correlation was noticed between birth weight and each of cotyledon number and cotyledon density (Alkass *et al.*, 2013).

### Fattening characteristics

Fattening characteristics, carcass traits and body composition for both black goat and Meriz are illustrated in Table (4). It seems that daily gain in weight is rather low for both breeds ranging from 0.068 to 0.14 kg, and feed efficiency ranged from 5.12 to 10.78 kg/ kg. Dressing percentage varied between 41.16% and 49.42%, such variation may be attributed to many factors, including age and weight at slaughter, nutrition, and the degree of body development. It was agreed that goats in general laid less fat as compared to other ruminant; therefore, fat thickness was low (0.30-1.75 mm) and rib eye area ranged between 6.60 and 12.47 cm<sup>2</sup>.

Table (3): Fattening performance and carcass traits of Meriz.

No.	22	20	9	12	12
Slaughter Wt. kg	-	19.92	25.08	17.97	-
Daily gain kg	0.068	0.071	0.110	0.06	-
FCE kg/kg	6.79	8.16	5.12	-	-
Carcass Wt.	8.05	8.50	11.84	7.09	-
Dressing percentage	41.16	42.26	46.96	47.36	-
Fat thickness mm	0.30	0.78	1.15	0.20	-
Rib eye area cm <sup>2</sup>	9.21	6.60	9.44	5.75	-
Lean %	64.37	-	64.15	-	63.60
Fat %	11.02	-	16.89	-	7.56
Bone %	24.58	-	19.02	-	28.76
Lean: Fat ratio	6.11	-	3.85	-	-
Lean: Bone ratio	2.99	-	3.38	-	-
Reference	Hassan (2023)	Alkass (2010)	Mayi and Alkass, (2010)	Dosky (2010)	Dosky (2009)

Studies on the effect of castration revealed that daily gain was not affected by castration. However, castrated kids had thicker fat compared to intact kids (1.34 vs. 0.98 mm) and a smaller rib eye area (7.30 vs. 8.47 cm<sup>2</sup>) (Sulaiman and Alkass, 2009).

Table (4): Fattening performance and carcass traits of Black goat.

No.	31	16	23	19	19	9	12	12
Slaughter Wt. kg	25.19	-	-	24.28	26.24	39.31	-	17.92
Daily gain kg	0.83	-	0.077	0.073	0.14	0.079	-	0.06
FCE kg/kg	8.08	-	5.36	10.78	-	8.99	-	-
Carcass Wt.	11.81	-	8.17	11.68	13.14	19.44	6740	6.77
Dressing percentage	46.64	-	41.19	47.88	49.35	49.42	-	47.44
Fat thickness mm	0.15	-	0.36	1.17	1.37	1.75	-	0.13
Rib eye area cm <sup>2</sup>	8.37	-	10.85	7.85	8.01	12.47	-	5.75
Lean %	-	65.12	60.52	65.81	60.43	63.73	63.78	-
Fat %	-	11.91	12.46	14.68	16.67	16.82	9.16	-
Bone %	-	22.95	26.96	19.50	22.89	19.44	27.04	-
Lean: Fat ratio	-	6.67	4.96	4.96	-	3.96	-	-
Lean: Bone ratio	-	2.84	2.42	3.41	-	3.29	-	-
Reference	1	2	3	4	5	6	7	8

1. Alkass *et al.*, (2014a). 2. Alkass *et al.*, (2014 b). 3. Hassan *et al.*, (2023). 4. Sulaiman, and Alkass. (2009). 5. Alkass, and Mahmmod (2016). 6. Mayi and Alkass, (2010). 7. Dosky *et al.*, (2009). 8. Dosky, (2010).

In further experiment involving goats and Meriz kids, it was noticed that intact kids had significantly higher daily gain and feed efficiency than castrated kids (Hassan *et al.*, 2023).

To investigate the effect of implanting intact and castrated kids with Ralgro (12 mg Zeranol) on growth and carcass traits, Alkass and Mahmmod (2016) indicated that kids implanted with zeranol had numerically higher gain (0.13kg) compared to

all castrated (0.11kg). Neither treatment with Zeranol nor castration affected dressing percentage, rib eye area, or fat thickness. However, Zeranol implanted kids deposited less fat in their bodies than did the intact kids.

Also, investigate the influence of administration zeranol by implantation and castration on fatty acid composition, Alkass *et al.*, (2018) found that mono unsaturated fatty acids have the highest contribution to the fatty acids of goat meat (54.87%), followed by saturated fatty acids and polyunsaturated fatty acids which imparting about 39.54 and 5.56%, respectively. Neither castration nor implanting with Zeranol alter significantly the fatty acid profile or polyunsaturated fatty acid (PUFA or SFA ratio or the proportion to C18-C18:1/C16).

**Milk yield and composition**

The milk yield of black goats varies with different reports. Total milk yield of 18 does raised in a commercial farm, as reported by Alkass and Merkhan, (2011) was 189.86 L. Whereas milk yield was 129.3 kg (Baper, 2020). (Table 5). It seems from one report available that the milk yield of 25 Meriz does averaged 95.91 L during 161.52 days (Alkass and Merkhan, 2011).

Table (5): Milk yield and lactation period of Black goat and Meriz.

Breed	No.	Total Milk yield kg	Lactation period day	Reference
Meriz	25	95.91	161.25	Alkass and Merkhan, (2011)
Goat	25	127.46	183.72	
	18	189.86	173.05	
Goat	41	136.8	-	Maarof <i>et al.</i> , (2009)
Goat	437	129.3	-	Baper, (2020)
Meriz	18	44.20	-	Dosky <i>et al.</i> , (2012)
Meriz	24	40.59	63.69	Mustafa and Yateem, (2019)
Goat	41	127.19	128.32	Salih and Maarof, (2004)
Goat	437	129.32	-	Baper and Hermiz (2019)

Two reports are available to compare milk constituents between black goat and Meriz raised on the farms. The results revealed that Mariz had a numerically higher content of fat, protein, solids not fat and total solids than black goat (Table 6) which may be attributed to lower milk yield by Mariz compared to black goat.

The udder and teat size characteristics and their relationship with milk yield were investigated in black goat and Mariz does, (Table 7) by Merkhan and Alkass (2011). Results revealed that no significant differences exist between the two breeds in all udder measurements except udder length. Also, it was observed that each of udder circumference and udder length were positively significant with total milk yield, initial milk yield and peak milk yield in both breeds. To develop a prediction equation for total milk yield from partial milk yield in native goats, Alkass and Merkhan (2012), indicated that the correlation coefficients between total milk yield and each monthly milk yield were all positive and highly significant, with the range being 0.665 - 0.932.

Table (6): Milk constituents of Black goat and Meriz.

Breed	No.	Milk component %					Reference
		Fat	Protein	Lactose	Solid Non Fat	Total solid	
Goat	10	4.7	3.70	4.33	8.7	13.04	Baker, (2007)
Meriz	10	5.31	4.25	4.34	9.33	14.64	
Meriz	140	4.12	3.77	4.33	8.78	12.89	Merkhan and Alkass, 2012
Goat 1	155	3.95	3.65	4.32	8.64	12.61	
Goat 2	101	4.20	3.96	4.35	9.02	13.20	
Meriz	15	3.52	4.88	4.53	-	-	Dosky <i>et al.</i> , 2011.
Meriz	18	3.73	4.59	-	-	-	Dosky <i>et al.</i> , 2012
Meriz	24	2.30	4.48	4.44	9.78	-	Mustafa and Yateem, 2019
Black goat	24	4.34	4.49	4.51	10.85	-	Hidayet and Mustafa, 2021

Based on a multiple regression equation using the maximum R- Square improvement between total milk yield and monthly yield, the following equation was developed: Total milk yield = 58.60± 3.02 milk yield at 2nd month.

Table (7): Udder measurements: udder width (UW), udder circumference (UC), udder length (UL), distance between teats (DBT), right teat diameter (RTD), left teat diameter (LTD), right teat length (RTL), and left teat length (LTL) in Black goat and Meriz goats.

Factors		Overall	Black goat	Meriz
Udder measurements	No.	68	43	25
UW (mm)		114.40± 2.46	116.17±3.63	111.34±2.40
UC (cm)		36.65±1.30	37.98±1.96	34.36±0.94
UL (cm)		6.89±0.57	7.86±0.86	5.21±0.22
DBT (mm)		87.99±2.70	90.71±3.93	83.30±2.77
RTD (mm)		17.88±0.55	17.71±0.80	18.16±0.64
LTD (mm)		18.29±0.69	18.44±1.02	18.03±0.68
RTL (mm)		36.13±1.18	35.70±1.61	36.87±1.64
LTL (mm)		36.05±1.27	35.83±1.89	36.44±1.23

Reference: Merkhan and Alkass (2011).

### Reproductive performance

In goats, reproductive efficiency is always considered to be the most vital factor especially when the major emphasis is on meat to ensure replacement, to provide surplus stock for sale to build up numbers, and finally to ensure as high selection differential as possible. (Alkass *et al.*, 2021). Mating season in goat's farms in the region started during September and extended for about two months. Therefore, kidding commenced in January continued until the end of March (Alkass and Mayi, 2011). Fertility expressed as a percentage of does kidded to total does exposed to bucks in different locations are presented in Table (8).

Table (8): Reproductive aspects of Black goat.

Trait	Reference		
	Alkass, (2009)	Alkass, and Mayi (2011)	Baper, (2023)
Fertility rate %	77.27	81.17	80.72
Conception rate %	89.67	92.4	87.15
Kidding rate %	91.73	94.0	84.94
Livability %	95.5	90.4	-
Litter size	1.19	1.15	-
Twinning rate %	24.06	-	-

Three studies conducted in commercial flocks revealed that fertility ranged between 77.27 and 81.7% (Table 8) depending on feeding and management practices followed in each location. However, improvement of reproductive performance has been achieved by hormonal treatment-following synchronization of estrus using sponges impregnated with 40 mg MAP. The highest fertility rates were in does injected with hCG (86.7%) and GnRH (93.3%) (Table 9). In a further experiment using hCG with flushing does prior to and during mating resulted in a higher fertility rate (80%), as compared to only flushing (60%), hCG (73.3%) or Control (66.6%) (Table 9). However, to achieve high genetic potential for fertility, Bradford and Berger (1988) suggested that systematic culling of unproductive animals may be the most important management practice to increase the number of lambs born in a flock of sheep.

Prolificacy in term of litter size expressed as a percentage of kids born to does kidded in goats is given in Table (9). In two commercial goat flocks, letter size was low (1.15-1.19). However, treating synchronized does with hCG resulted in a marked increase in litter size (1.69), and consequently kidding rate was increased (146.7%) (Table 9). However, an increase in prolificacy could be achieved by selection or crossing with prolific breeds, and improving the body condition of does pre-and post-mating through flushing as well as by exploring the possibilities of hormonal therapy.

Table (9): Effect of hormonal treatment on reproductive traits of Black goats.

	Control	hCG	eCG	GnRH	Control	hCG+F	F	hCG
Fertility rate %	86.7	86.7	66.7	93.3	66.6	80	60	73.3
Conception rate%	86.7	100	73.3	93.3	86.6	100	80	86.6
Litter size	1.61	1.69	1.50	1.21	1.3	1.50	1.4	1.4
Twinning rate %	53.8	53.8	40	21.42	30	50	44.4	45.4
Kidding rate %	140	146.7	100	113.3	86.6	120	86.6	106.6
Bamerny <i>et al.</i> , (2022)					Bamerny <i>et al.</i> , 2024			

Results revealed the body weight at puberty and daily gain in weight on Meriz kids averaged  $24.39 \pm 0.46$  and  $0.116 \pm 0.003$  kg respectively (Alkass *et al.*, 2015). The achievement of high levels of fertility and prolificacy in sheep and goat relies not only upon the female members but also upon the male consorts (Alkass *et al.*, 1982). A study was undertaken to compare seminal traits of black goat and Meriz bucks together with the effect of season on these trails by Alkass and Ahmed (2011). from Table (10), results revealed that all studied traits were higher in goat bucks compered to Meriz bucks, Although, a non-significant effect of month of collection noticed in all seminal traits except percent live sperm, however, semen quality and testosterone

level was at its best in November. In a further study in Meriz bucks and extended for a year, Zebari (2011) indicated that seasonal variation in semen quality and quantity were evident, and the best semen traits was an obtained during autumn (September and October (Table 10). However, it was noticed that bucks failed to ejaculate using electro-ejaculator during winter months (January, February and early march).

Table (10): Seminal traits of black goat and Meriz bucks.

Trait	Black goat	Meriz (n:29)	Meriz (n:6)
Volume ml	0.97	0.70	0.69
Color	3.44	2.93	3.61
Mass motility %	83.0	71.18	3.66*
Individual motility %	89.47	80.17	77.7
Concentration x107ml	113.50	81.72	196.6
Live sperm %	78.93	57.41	81.2
Abnormal sperm %	7.00	22.31	12.20
No. sperm/ ejaculate x 107	116.29	58.3	132.2
Reference	Alkass and Ahmed, (2011)		Zebari, (2011)

\* Mass mortality (grade) assessed according to Avdi *et al.*, (2004)

### Genetic parameters

Limited information is available on the genetic parameters on both breeds. However, a study by Baper (2020) revealed that the estimates of h<sup>2</sup> were as follows.

Trait	h <sup>2</sup>
Birth weight	0.41
Weaning weight	0.61
Weight at 6 month	0.35

### CONCLUSIONS

Since characterization of this important breeds are not well documented, therefore, much work is need in different aspect such as milk and meat in Black goat and hair in Meriz including new technologies such as more effective reproduction management, improved feeding system as well as the use of genetically improved animals to improve the economic traits.

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### CONFLICT OF INTEREST

We declare that we don't have affiliation or entity with any organization regarding the financial a non- financial interest in this subject matter discussed in this article.

أداء الماعز المحلي في إقليم كردستان العراق: مراجعة

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الخلاصة

تتواجد سلالتين من الماعز في إقليم كردستان العراق، وهما الماعز الجبلي الأسود الذي يربي بشكل أساسي لإنتاج اللحوم والحليب، والمرعز الذي يربي بشكل أساسي للشعر إضافة إلى اللحوم والحليب. تعرضت هاتين السلالتين وعلى مدى فترة طويلة من الزمن لظروف قاسية وشبه جافة، ونقص الأعلاف والأمراض المنتشرة. وكان هذا التكيف لمثل هذه الظروف على حساب الصفات الاقتصادية المهمة. من الأبحاث المنشورة القليلة لكلا السلالتين، يتبين أن المرعز ذات حجم أصغر من الماعز الأسود والزيادة اليومية منخفضة إلى حد ما للسلالتين وتتراوح بين 0.068 إلى 0.140 كغم. ويبدو أن الماعز الأسود له القدرة على الاستجابة لتحسين إنتاجية الحليب (127-189 لتر). بشكل عام، الخصوبة والخصب منخفضة إلى حد ما في الماعز الأسود والمرعز ويمكن تحقيق تحسن في الأداء التناسلي من خلال العلاج الهرموني و/ أو الدفع الغذائي، وبينت الدراسات التي أجريت على صفات السائل المنوي بأن الذكور هي موسمية التناسل خاصة في المرعز. ومع ذلك، فالحاجة تدعو إلى مزيد من الدراسات للصفات الاقتصادية لهاتين السلالتين. الكلمات المفتاحية: الأداء، التناسل، الحليب، الماعز الأسود، المرعز.

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