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STUDY OF PHENOTYPIC DISTRIBUTION OF LOCAL IRAQI SHEEP

Wafaa S. Al-Sabea[1], Drgham H.Y. Al-Zwean[2] and Mohammad A. Al-Faham[3]

[1]Sheep Department, Agriculture Research Directorate, Ministry of Science and Technology, Iraq.
[2]Faculty of Veterinary Medicine, University of Baghdad, Iraq.
[3]Faculty of Medicine, University of Baghdad, Iraq.

Abstract

This study was conducted to study phenotypic distribution of local Iraqi sheep. The phenotypic traits were collected according to the special search form a total of 100 individuals were collected randomly from Iraqi sheep populations in order to study their phenotypic traits. Three populations were studied under this project which are suspected present in Iraq (Awassi, Naimi, Hamdani sheep population). Males Awassi sheep which recorded in phenotypic traits white body color, fine wool type, long pendulous ears and horned, while females Awassi sheep recorded white body color, carpet wool type, long ears pendulous, no horn and high level in litter size. Naimi males showed with white body color, carpet wool type, long pendulous ears, horned, while Naimi females showed with white body color, carpet wool type, short ears, no horn and twins litter size. Hamdani male population recorded brown body color, carpet wool type, long pendulous ears and no horn. Hamdani female population recorded white and brown body color, fine wool, long pendulous ears, no horn and twins litter size.

***Key words*:** Local Iraqi sheep, phenotypic traits, Awassi sheep, Naimi sheep, Hamdani sheep.

Introduction

The history of the domesticated sheep goes back to between 11000 and 9000 BC, sheep are among the first animals to have been domesticated by humans. These sheep were primarily raised for meat, milk and wool production (Christina, 2017). Sheep are found in intensive and extensive production systems and in cold to hot environments, the exact line of descent between domestic sheep and their wild ancestors is unclear *(Hiendleder et al., 2002)*. Sheep are ruminant mammals kept as livestock for the production of meat, milk and wool in agricultural industries across the globe, sheep also faced challenges with coping with different diseases in various environments (FAO Food and Agriculture Organization, 2015). Sheep represent the most important livestock in Iraq are bred for meat, milk and wool, the annual incomes of these products is about 60%, 25% and 15% respectively (Aziz and Hama, 2008).

There are three breeds of Iraqi sheep and sub breed follow these breed and it may not be pure because of confusion and crossing with other breed, but they differ among themselves in the phenotypic and productive characteristics, these breeds are Awassi (Naimi), Karadi (Hamdani) and Arabi sheep (AL-Kudis, 2012, Oramari, 2014). Awassi is dominant type in Iraq and most famous species, represented about 60% of Iraqi sheep, it is mainly raised for the production of meat, milk and wool, which are sheep wool carpet (AL-Dabbagh, 2009). Characterized by white wool color and a red-brown color covering the face with a white tuft on the front, ears are semi-pendulous and the tail is fat, round, medium sized and short, reaching only to the hocks and fat tailed (Said *et al*., 1999). Males are characterized by presence of horns and arched front**.** Females are characterized by absence of horns most often (Kassem *et al*., 2010). Naimi which are similar to Awassi produce fine wool, white color and light fleeces. Karadi like the other Iraqi breeds of sheep which is fatty tail and gives carpet fleece (Zin-ALabidin and Ayhan, 2017). Characterized by the color of the black face or dark brown, open face and pendulous ears shorter than those of the Hamdaniand, absence of horns and have coarsest wool among the Iraqi sheep breeds (Al- Murrani *et al*., 1980).Hamadani sheep is one of the important and favored indigenous strain of Karadi sheep among sheep owners due to its high

twinning rate (Al-Kamali, 1976), large body frame, heavy fleece weight and often have colored fibers and coarse wool, also it has large ears wide range pendulous and absence of horns in both sexes (Aziz,1993; Juma and Alkas, 2000).

Materials and methods

Samples of the current study were obtained from 100 individuals animals, were collected randomly from Baghdad and suburbs representative of all central and southern provinces. The phenotypic traits were collected according to the special search form (Appendix 1). The traits studied were as follows (Appendix 2): sex of animal, body color, Face color, horns, ears shape, body score, littre size for female, length testes for male, length of the animals and the dimensions of the body which took by metric tape (AL-Saigh, 1992).

Results

Sheep Phenotypic Distribution of Awassi Sheep

Phenotypic distribution of male and female of Awassi sheep explained in appendix 4, showed 52 number of Awassi sheep (26 male, 26 female) and Fig. 1 showed results of male Awassi sheep were have high level in distribution of white body color and fine wool type in percentage 81% then white carpet wool, red fine wool respectively compared to female Awassi sheep have high level in distribution of white carpet wool then white fine wool, brown fine wool respectively, in percentage 73.08%, 23.08% and 3.85% respectively, Fig. 2.

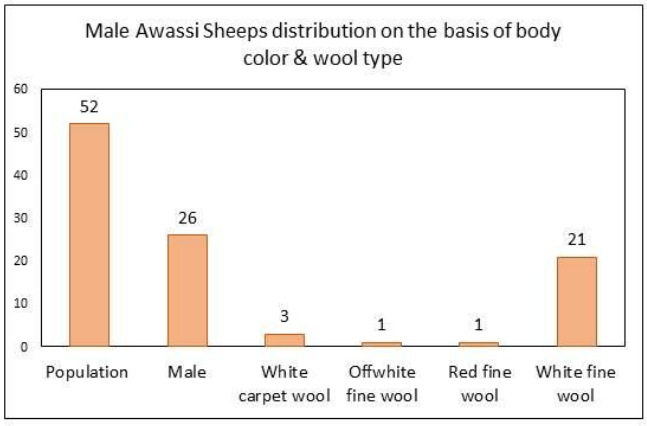
Fig. 3 explained comparison between male and female Awassi sheep and showed the male which have high level fine white type wool and long pendulous ears types than female in 80.77% percentage distribution, while female Awassi which have high level in distribution of white carpet wool and long pendulous ears types in percentage 61.54% Fig. 3 than fine white type wool and long pendulous 23.08%.

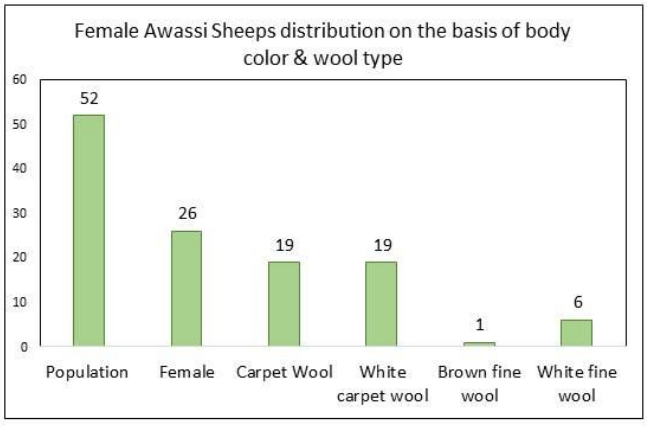
Fig. 4 explained the average length of testes for Awassi males, according to age. 14.58cm for 3Months - 1 year and 19.11cm for 1 - 2.5year then 22.67cm for 2.5-6 years.

Fig. 5 showed the percentage of distribution of body-color, wool-type, ear-type and presence of horns for female Awassi sheep which recorded (53.85%, 11.54%, 7.69%, 3.85%) respectively for White-carpet long pendulous- No horn, White carpet, short ears, no horn, white carpet, long pendulous, horned, brown fine, long pendulous and no horned respectively.

Fig. 6 showed Awassi female sheep which recorded 64% in trait Twin litter size, 13% single litter size and 23% without litter size.

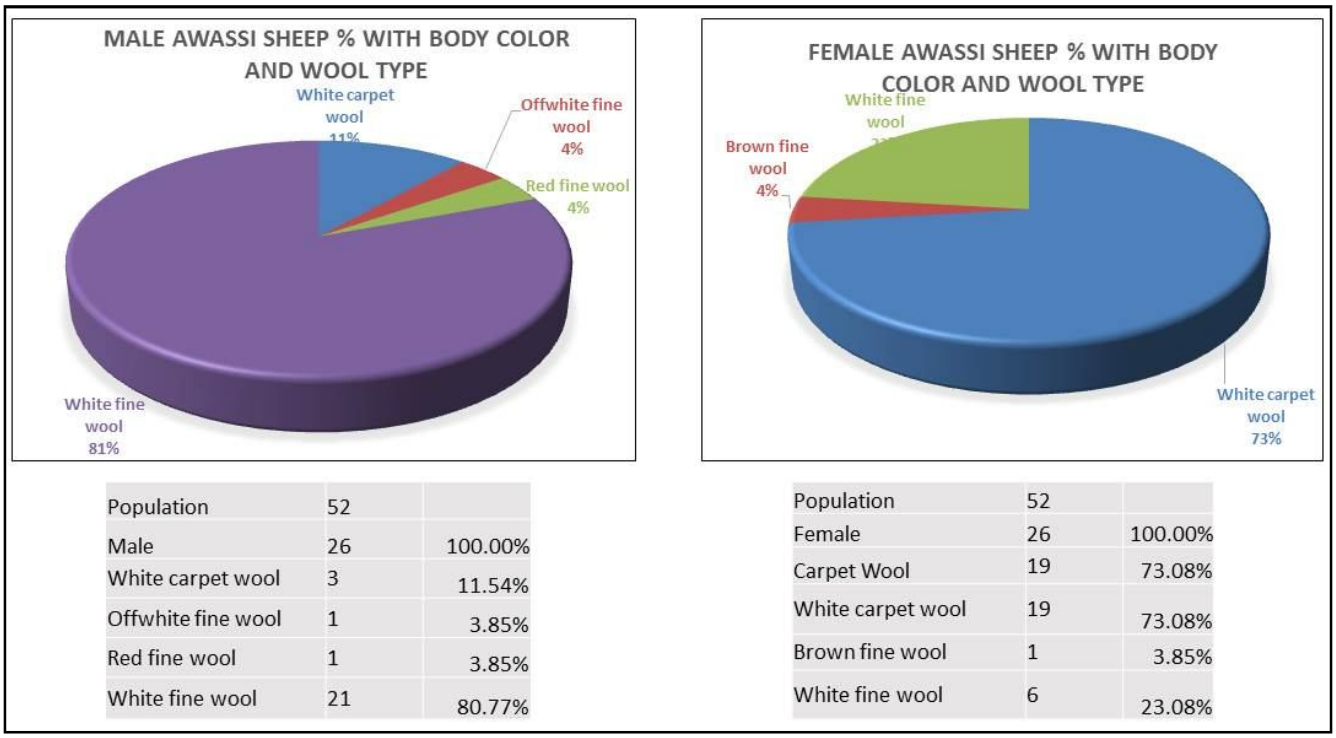
Fig. 7 showed 75% of Naimi male with white carpet wool type, long pendulous ears and horned but showed 100% which the white fine wool type with other same traits while Naimi female showed 100% white-carpet wool type, Short ears and no horn, also Naimi female showed 83% offwhite-carpet wool, short ears and no horn.





Awassi Population	Sex	Wool type	Body Color
52	Male 26	3 carpet	3 white
		23 Fine	1 offwhite
			1 Red
			21 White
	Female 26	7 Fine	1 brown
			6 white
		19 carpet	19 white

Fig. 1: Awassi Sheep: Distribution on Basis of Wool type and Body color.



Population	52	
Male	26	100.00%
White carpet wool	3	11.54%
Offwhite fine wool	1	3.85%
Red fine wool	1	3.85%
White fine wool	21	80.77%

Population	52	
Female	26	100.00%
Carpet Wool	19	73.08%
White carpet wool	19	73.08%
Brown fine wool	1	3.85%
White fine wool	6	23.08%

Fig. 2: Awassi sheep: Body Color and Wool Type % Distribution.

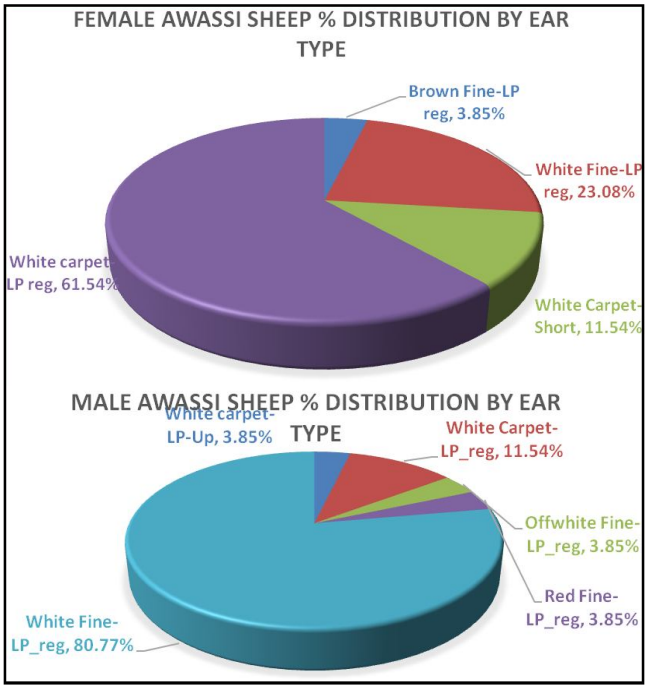
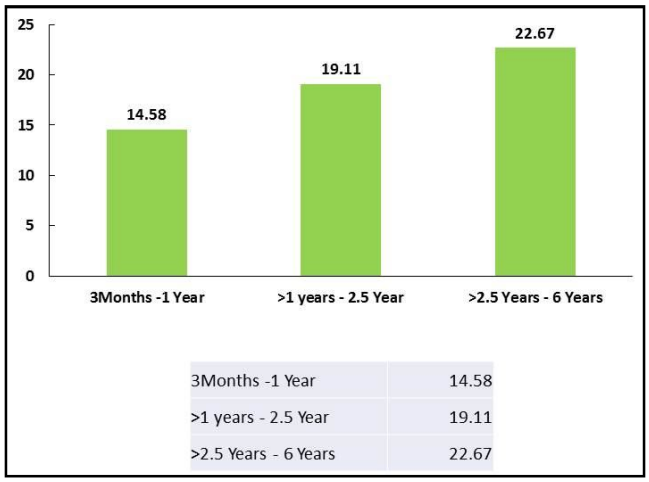


Fig. 3: Awassi Sheep (Male and Female) Population % Distribution: Body color, Wool type, Ear type.

Fig. 8 showed the average size of testes (19.6cm) for males in age group >1year-4 years.

The total of Naimi females are (12) and Fig. 9 showed 50% with Singlet, 50% with twins. Hamdani female population showed in Fig. 10 83% white carpet percentage distribution on the basis body color and wool type respectively, while Hamdani male showed 14%,14%



3Months -1 Year	14.58
>1 years - 2.5 Year	19.11
>2.5 Years - 6 Years	22.67

Fig. 4: Average Length (in cm.) of Testes in Awassi Males.

white carpet, brown carpet respectively and 29%, 14% white fine, brown fine respectively and 29% white and brown fine on the basis body color and wool type.

Hamdani male showed in Fig. 11 14% brown carpet, long pendulous, no horn and 0% brown fine, short ear, no horned. While Hamdani females Fig. 12 showed 50% white and Brown, fine wool, long pendulous, no horn and 33% White-carpet-long pendulous-horned while 83% only traits white color and carpet wool type Fig. 10.

Fig. 13 explained the measurement of average length of testes in Hamdani male about 14.8 cm in age 3months – 1year and 28.5 in age 1-4 years.

The Fig. 14 showed 75% of Hamdani female with

twins and 25% with Single litter size.

Discussion

Samples of the native breeds (*Ovis aries*) include Awassi, Arabi, Na'aimi, Karadi and Hamdani (AL-Barzinji, 2013) were randomly collected from different areas of Baghdad and its outskirts.

The phenotypic traits were taken and recorded in a special form prepared for this purpose Appendix 1. After classification of animals genetically (ALSabea *et al*., 2019), each group of animals were classified according to their phenotypic characteristics as shown in Appendix 3 explained phenotypic distribution of male and female of Awassi sheep.

Awassi sheep breed was an important genetic resource that plays a significant role in sheep industry in more countries (Galal *et al*., 2008).

It is mainly raised for the production of meat, milk and wool, which are sheep wool carpet (AL-Dabbagh, 2009). The main phenotypic traits of Awassi sheep: white wool color, carpet wool type, pendulous ears, presence horns in males and absence of horns in females, typically, the wool of the Awassi is white with a yellowish hue (Goneim *et al.*,1973).

Awassi Sheep

81% percentage showed in Fig. 2 males with white body color and fine wool type and females with 73% white carpet wool (Said *et al*., 1999). They have an intermediate fineness lying between Na'aimi sheep (finest) and the Karadi sheep (coarsest) (Al-Murrani *et al*., 1980) or due to attempted by breeders to improve the performance of animals by mixed them with foreign breeds (Gizaw *et al*., 2011).

Furthermore in current study males Awassi sheep were horned and females were having no horns Fig. 3, 5 and this is what (AL-Saigh, 1992) mentioned in his study. Kassem *et al*., (2010) also referred to presence horn in males and absence it in females.

The efficiency of sheep production highly depended on reproductive performance, especially in countries where the sheep industry is important (Ibarra *et al*., 2000). Reproductive performance in sheep could be expressed in a number of economically important quantitative traits such as fertility and the proportion of twins (AL-Quss *et al*., 1994).

There are some measurements that vary depending

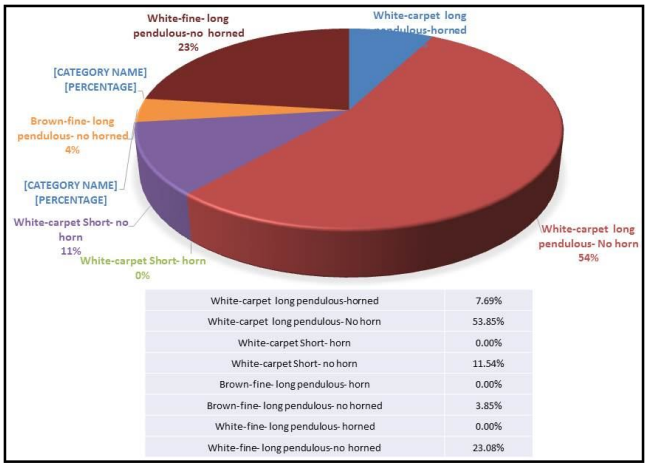


Fig. 5: Female Awassi sheep % Distribution by Body color, Wool type, Ear type and Presence of Horne.

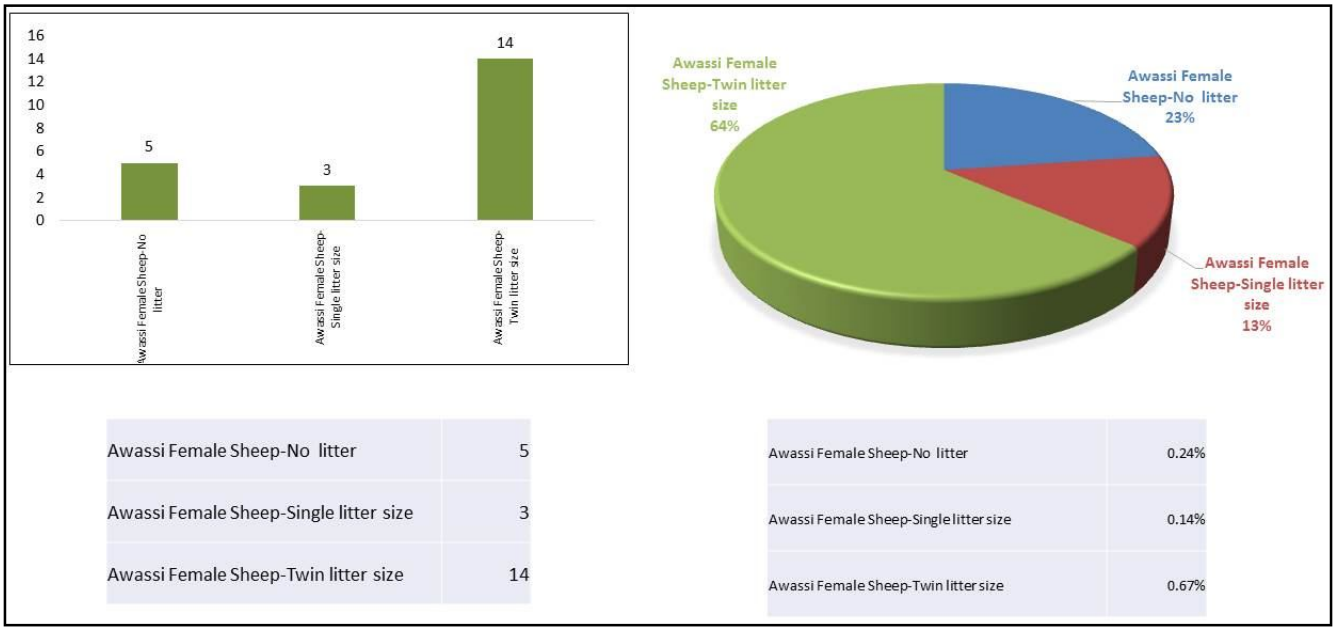
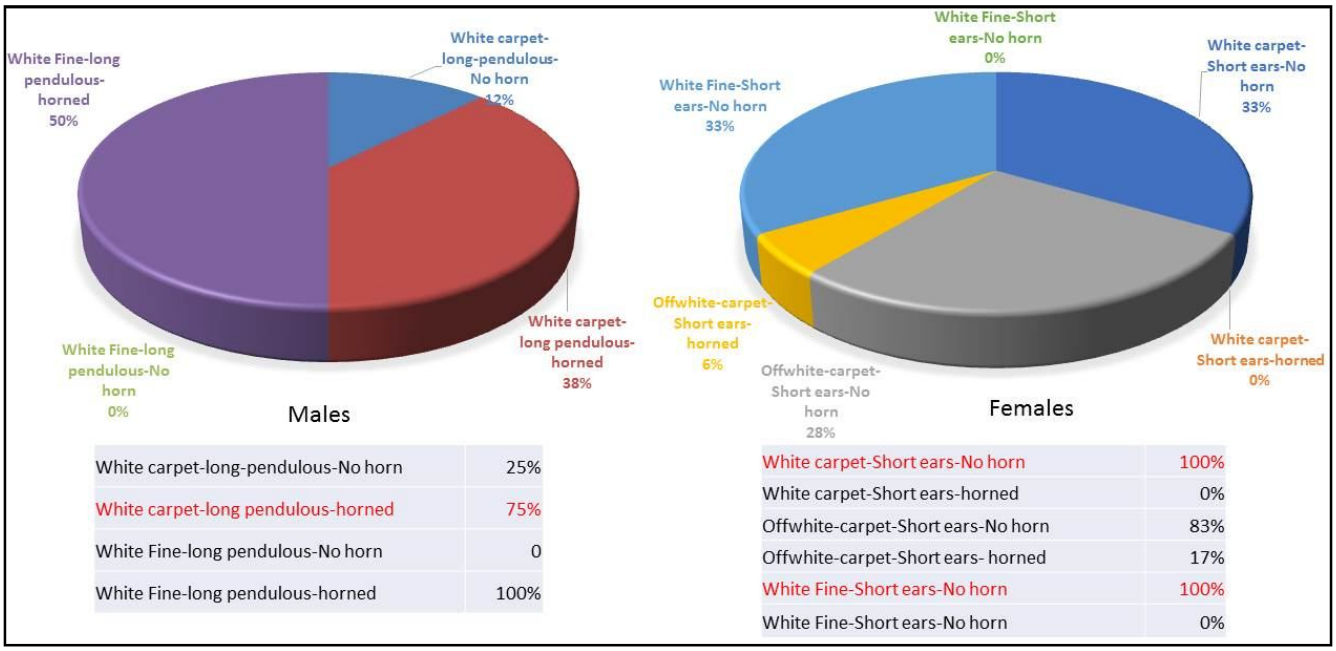


Fig. 6: Awassi Female Population and % Distribution Based on Litter Size.



White carpet-long-pendulous-No horn	25%
White carpet-long pendulous-horned	75%
White Fine-long pendulous-No horn	0
White Fine-long pendulous-horned	100%

White carpet-Short ears-No horn	100%
White carpet-Short ears-horned	0%
Offwhite-carpet-Short ears-No horn	83%
Offwhite-carpet-Short ears- horned	17%
White Fine-Short ears-No horn	100%
White Fine-Short ears-No horn	0%

Fig. 7: Naimi Male and Female Population% Distribution on the Basis of Presence or Absence of Horns along with Wool type, Body color and Type of Ears.

on the sex of the animals such as testes measurement for males and litter size for females (Afolayan *et al*., 2006; AL-Brkat, 2017). Epstein (1985) reported the scrotum is well developed in Awassi ram and hermaphroditism is extremely rare in the Awassi males.

Fig. 4 showed progressive growth of testes with male age. Scrotal measurement is a widely used as parameter in assessing breeding health of rams and, the correlation between scrotal circumference and testicular weight,

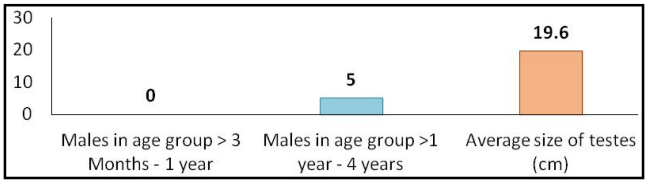
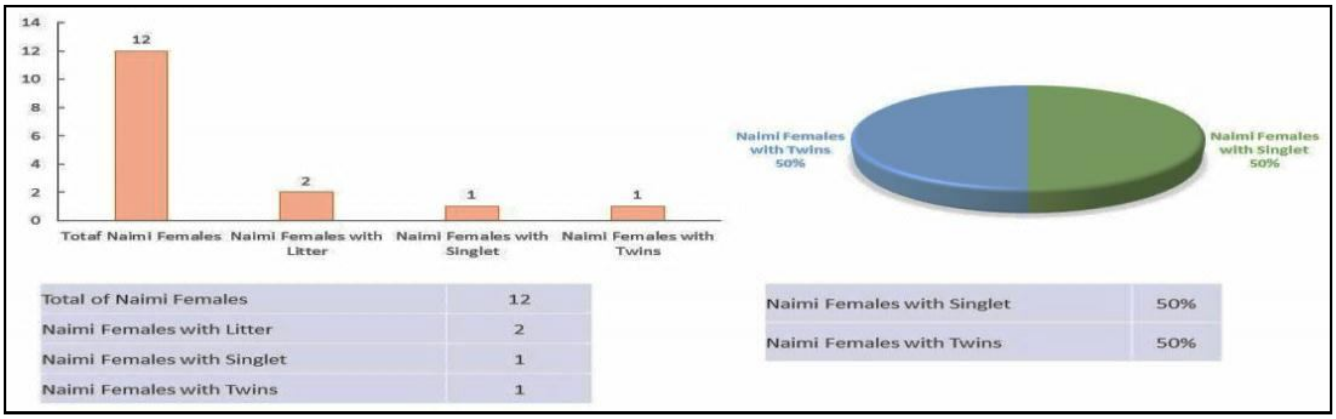


Fig. 8: Average length (in cm.) of Testes in Males of Naimi Sheep Population.

number of sperm in the testes and number of sperm in the epididymis (Lino, 1972). Knight (1977) reported in measurement of scrotal volume of Merino rams combined with age gave good estimates of testes weight and male reproductive success is often linked to difference in testes size, as larger testes are supposed to produce more sperm.

Barr (1969) noted that, Awassi ram lambs should be separated from the females not later than at five months of age, at five to six months they produced normal spermatozoa and could be used for service at seven months. Although the Awassi sheep breed was one of the poorer breeds of reproductive performance however, they are sexually active throughout the year and their effectiveness is higher in spring and autumn than in summer and winter (Tabbaa *et al*., 2008 ; AL-Brkat, 2017).

Lino (1972) and Nse Abasi (2015) confirmed a

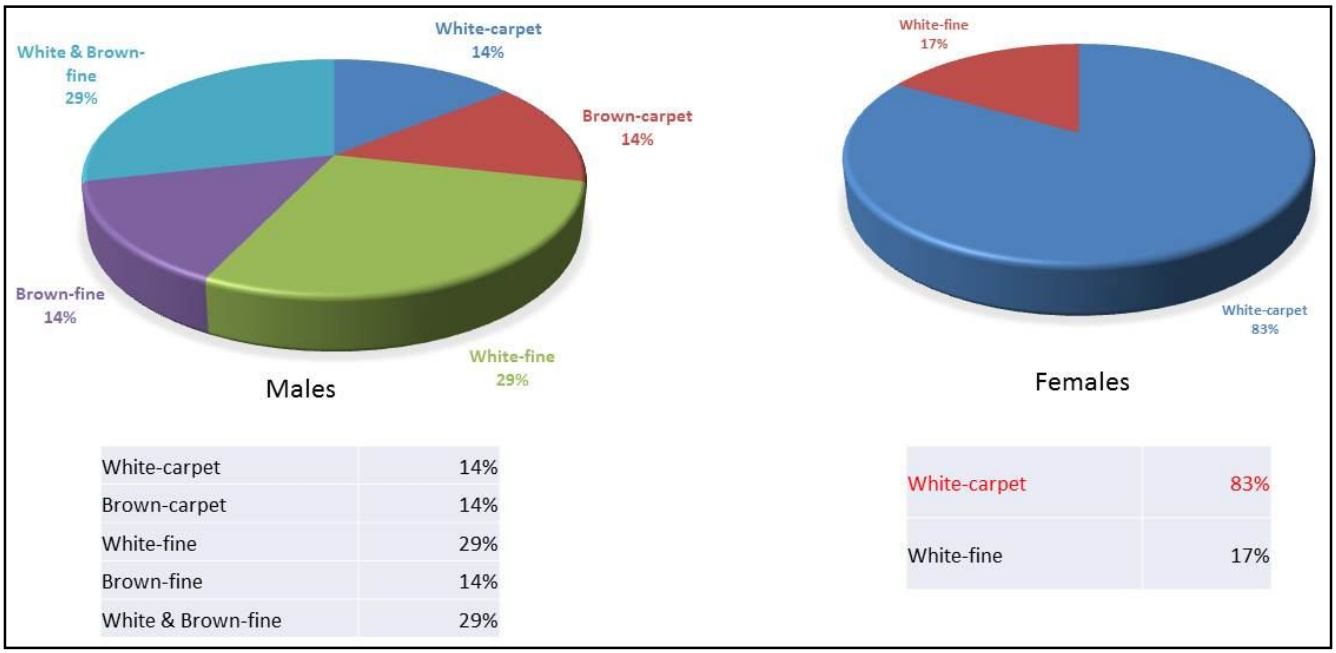


Total of Naimi Females	12
Naimi Females with Litter	2
Naimi Females with Singlet	1
Naimi Females with Twins	1

Naimi Females with Singlet	50%
Naimi Females with Twins	50%

Fig. 9: Naimi Sheep Female Population and % Distribution Basis on Litter size.

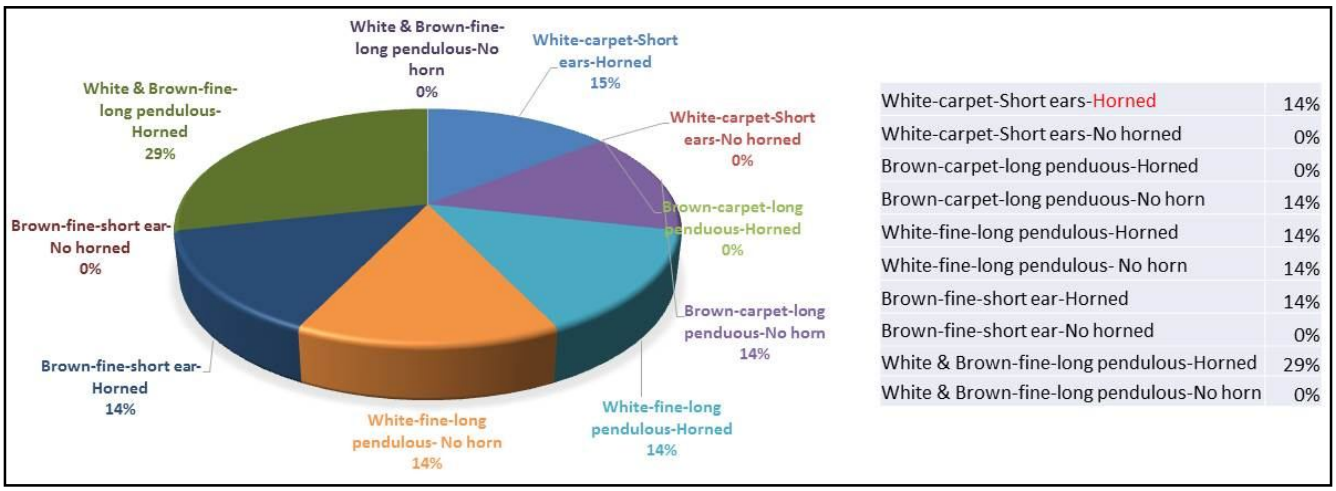
positive relationship exists between semen quality and testicular dimension, giving an indication that improvement



White-carpet	14%
Brown-carpet	14%
White-fine	29%
Brown-fine	14%
White & Brown-fine	29%

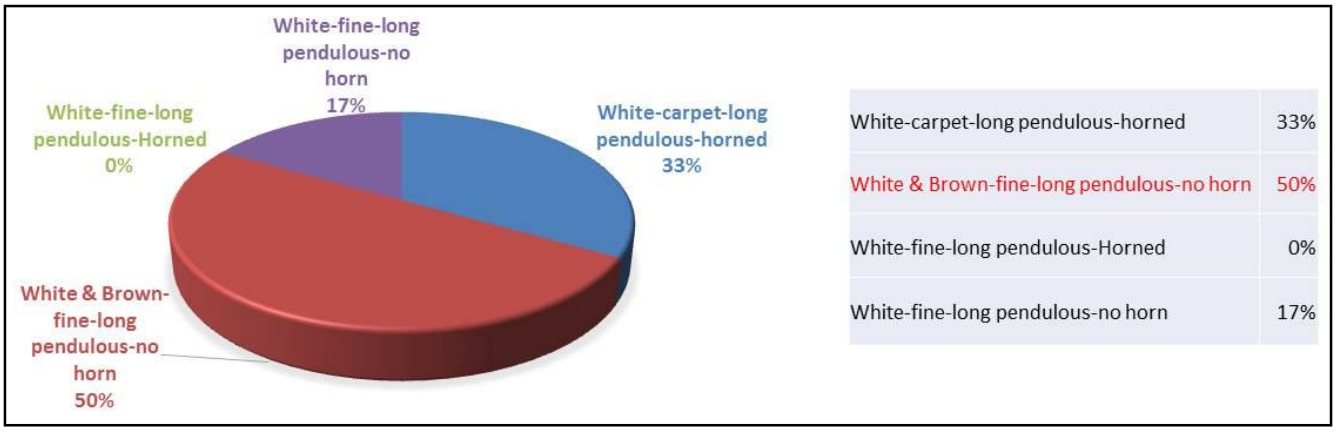
White-carpet	83%
White-fine	17%

Fig. 10: Hamdani Male and Female population % distribution on the Basis Body color and Wool type.



White-carpet-Short ears-Horned	14%
White-carpet-Short ears-No horned	0%
Brown-carpet-long penduous-Horned	0%
Brown-carpet-long penduous-No horn	14%
White-fine-long pendulous-Horned	14%
White-fine-long pendulous- No horn	14%
Brown-fine-short ear-Horned	14%
Brown-fine-short ear-No horned	0%
White & Brown-fine-long pendulous-Horned	29%
White & Brown-fine-long pendulous-No horn	0%

Fig. 11: Hamdani Male Population % Distribution on the Basis of Body color and Wool type, Ear type and Presence or Absence of Horns.



White-carpet-long pendulous-horned	33%
White & Brown-fine-long pendulous-no horn	50%
White-fine-long pendulous-Horned	0%
White-fine-long pendulous-no horn	17%

Fig. 12: Hamdani Female Population %Distribution on the Basis of Body color and Wool type, Ear type and Presence or Absence of Horns.

in one would lead to improvement in the other, the testicular and epididymis morphometric is essential for a maximum utilization of the breeding stock and increased in improvement animal production and there is a good correlation between the number of spermatozoa stored in the genital tract and the testicular production of spermatozoa in the ram (Lino,1972).

While some researchers suggested that testicular size gave a good index of testicular sperm output in rams (Lino, 1972, Langford *et al*., 1989). Fernandez *et al*. (1999) did not record a relationship between testicular size and sperm production.

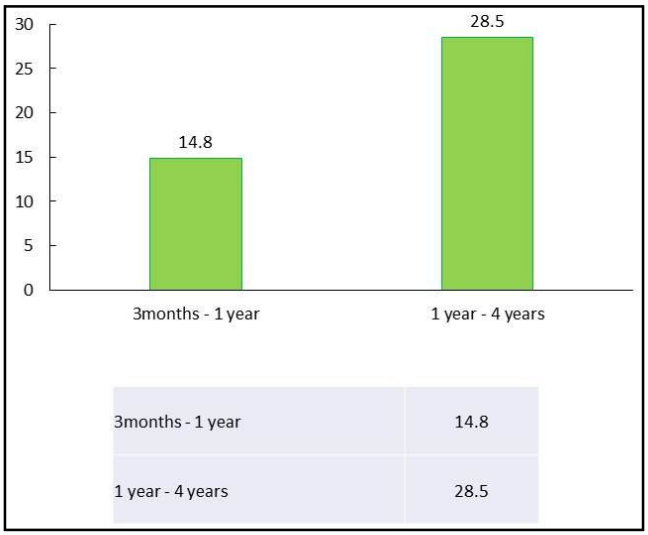


Fig. 13: Average Length (in cm.) of Testes in Male of Hamdani Sheep Population.

Regarding for females the Litter size as Fig. 6 showed Awassi female sheep which recorded 64% in trait twin litter size and 13% single litter size, although the genetic equivalent of this trait is low in sheep as indicated by (Nichol *et al*., 2009), but this trait is one of the most important economic characteristics of reproductive production (Javanmard *et al*., 2011). As the researcher pointed out (Kridli *et al*., 2009) that the fertility rate in Awassi sheep is about 76-95% according to environmental and nutritional condition also (Abbas *et al*., 2010, Ahmed, 2017) reported the twining rate which consider one of the importance reproduction traits but it low inheritance and estimated heritability up to 0.04-0.11. But (Treacher *et al*., 1992) explained the Awassi is not considered a prolific breed and according to farmers, about 85-90% of pregnant sheep give birth to a single lamb, however, the percentage of twins can reach 10-15% in good years.

Galal *et al*., (2008) stressed on the selected of Awassi sheep which characterized by milk yield, body weight and litter size.

Bradford (1974) and Al-Barzinji (2013) referred to the litter size are the main factors for improving reproductive rate in sheep and many studies have indicated that the ovulation rate and litter size can be genetically regulated.

Naimi Sheep

Naimi sheep are part of Awassi sheep breed, but are smaller and more milky than the original strain, they are raised in the northern and western Badia of Iraq and

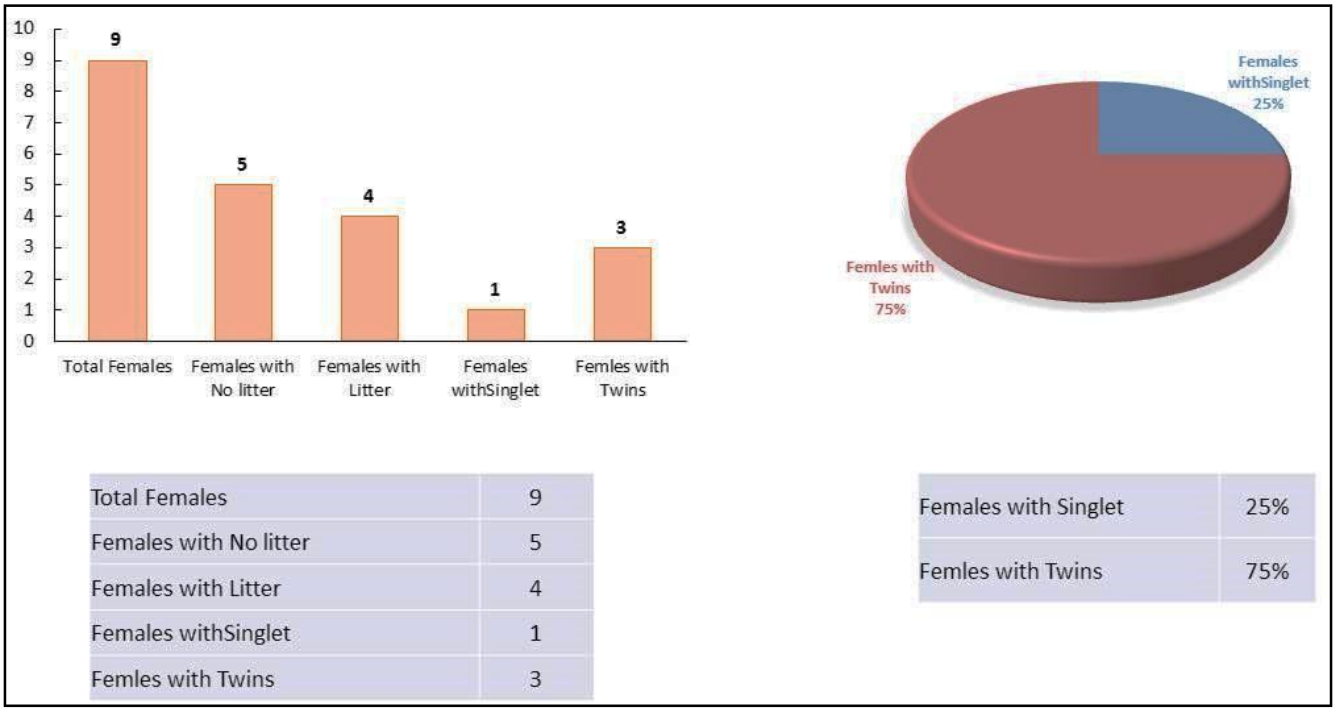


Fig. 14: Hamdani Sheep Female Population and % Distribution Basis on Litter size.

have the ability to travel long distances and endure hunger and thirst and lack of food needs (Al-Murrani *et al*., 1980, Epstein, 1985).

which as Fig. 7 showed males and females Naimi sheep with white to off white body color, carpet to fine wool type, males with pendulous ears and females with short ears (semi pendulous) this is compatible what is reported by (Mason, 1967, Epstein, 1985) Naimi sheep is a more compact sheep than the ordinary Awassi, with shorter and more muscular limbs, a finer and denser fleece and a higher milk yield.

Also showed horned males and no horn for females as like males and females Awassi sheep breed due to the appearance features in Na'aimi sheep are the same as those described for Awassi sheep (Al-Murrani *et al*., 1980).

Due to small population of males Naimi sheep showed in Fig. 8 average size of testes are (19.6) cm and because of Naimi sheep which are part of Awassi sheep breed, Nse Abasi (2015) confirmed a positive relationship exists between semen quality and measurements of testicular, giving an indication that improvement in one would lead to improvement in the other.

Elmaz *et al*., (2007) reported there is a significant and positive correlation between testicular dimension and semen characteristics (progressive motility, semen volume) in rams.

Females Naimi sheep in Fig. 9 showed litter size with twins 50% equally with singlet 50% due to found many females pregnant during time of collected samples. Also since the Naimi sheep are part of Awassi sheep breed and litter size of Na'aimi sheep are the same as those described for Awassi sheep, Galal *et al*., (2008) stressed on the selected of Awassi sheep which characterized by milk yield, body weight and litter size and it is one of the most important economic characteristics of reproductive production (Javanmard *et al*., 2011).

Hamdani Sheep

Fig. 10 showed females Hamdani sheep with 83% white body color and carpet wool type, while males distribution between carpet fine wool type respectively may be and due to small sample population. Aziz (1993), Juma and Alkas (2000) reported about Hamdani sheep which have fat tailed, carpet wool sheep and heavy fleece weight, also they have large size and they represent about 20% of the total sheep population of the country.

Fig. 11, 12 appeared males and females Hamdani sheep with long pendulous ears shape and absence of horns, this is agreement with (Al-Mourrani *et al*., 1980) reported characterized by the large ears with wide range pendulous and absence of horns in both sexes.

Reproductive efficiency is one of the most important factors in the production and breeding of sheep for any animal project which based on fertility (Atsan *et al.*, 2007).

The increase in the fertility rates of local sheep will, as a result, significantly improve sheep production efficiency (AL-Quss *et al*., 1994; Al-Shujairi, 2017).

Fig. 13 showed the average length of testes is higher in males Hamdani sheep than other breeds in same stage of age. Juma *et al*., (1983) and AL-Sayyed (2009) reported the size of the testes is genetic trait and the size of the testicular tissue is used as evidence of changes in reproductive capacity, there is a significant correlation between the size of the testicular tissue and sperm production, which studies have found that testicular size increases in the breeding season compared to other seasons.

Females Hamdani sheep appeared with high rate litter size (75%) of twins birth in Fig. 14, which is agreement with (Al-Kamali, 1976, Aziz, 1993 and Juma, Alkas, 2000, Kasim, 2005) that's Hamadani sheep is one of the important and favored indigenous strain of Karadi sheep among sheep owners due to its high twinning rate, high milk production, large body frame and heavy fleece weight (Aziz, 2005).

Conclusion

Males Awassi sheep which recorded in phenotypic traits fine wool type, long pendulous ears and horned while females recorded carpet wool type, long ears pendulous, no horn and high level in litter size. Naimi sheep males showed long pendulous ears and horned while Naimi females showed with short ears, no horn and twins litter size. Hamdani males and females population recorded long pendulous ears and no horn.

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