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Scrutinizing the Effect of some Physiological and Histopathological Factors on Kids Mortality of Shami and Baldi Goat during Neonatal Period

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ABSTRACT

The foremost important aim of the present study was to scrutinize some physiological factors and histopathological conditions in lungs of Baladi and Shami goat's kids and its effects on mortality rate during neonatal period. The current study was launched at Ras Sudr Research Station, located at South Sinai, belonging to Desert Researcher Center. Cairo, Egypt. Twenty five adult does of each breed (average 18 months old) were used in breeding season. All does were estrus synchronized and naturally mated. The obtained kids were kept with their mother during the entire experimental period (one month from February to March 2017) and fed only with colostrum and maternal milk. Kids' live body weight changes, colostrum composition and its immunoglobulin M (IgM) content, daily milk yield and composition, total serum protein and its fractions in both dams and their offspring's were estimated. Dead kids were dissected immediately and lungs were collected for histopathological examinations.The overall mortality rate was significantly affected by the breed and recorded 23.07 % and 56.45% in Baladi and Shami kids respectively. Mortality rate was significantly higher in male than female kids. The level of IgM was higher ($P<0.01$) in colostrum of Baladi than in Shami does. However, Shami does gave higher ($P<0.001$) milk yield. Goat breed had no significant effect on percentage of milk content of protein, ash, solid not fat (SNF) or total solids (pg/ml), while milk fat (%) and lactose (%) were higher ($P<0.001$) in Baladi goats milk. Blood serum of Baladi does showed higher values of total protein, albumin, alpha-2 globulins, gamma globulins and A/G ratio, but lower values of alpha-1 and beta globulins in comparison with that of Shami does. For kids, serum total protein, albumin, alpha-1 globulins, beta globulins and A/G ratio were higher ($P<0.001$), while alpha-2 globulins and gamma globulins were lower ($P<0.01$) in Shami than Baladi kids. In both breeds, all these parameters increased ($P<0.01$) after 21 days of parturition with the exception of gamma-globulins which decreased significantly during neonatal period.The lung lesions were grossly recorded 85.71% in dead kids. Histopathologically, broncho-pneumonia, bronchoectasia, emphysema of lung and pneumonia were recorded.It could be concluded that exposure of neonates to cold stress (hypothermia) that was prevailing during experimental period induced a significant increase in the incidence of pneumonia which greatly resulted in kid's mortality. The higher mortality rate of Shami kids might be related to the lower IgM level in colostrum of their dams.
Keywords: goat kids, colostrum, serum proteins, pneumonia, neonatal mortality.

INTRODUCTION

Shami goats were introduced to Egypt through Sinai boarders for its high productive traits such as adult weight and milk yield. However, this breed exhibited higher kids' mortality rate than local breeds which cause economical loss to the breeders.

Piccione *et al.* (2006) stated that in mammal species, the first week after parturation represents a critical stage, it is a move phase from the sheltered intrauterine to the exposed extra-uterine environment. Dwyer (2008) identified that the causes of young mortality can be broadly categorized as relating to the birth procedure and neonatal acclimatization to postnatal life. The major factors affecting the pre-weaning growth are: genotype, birth weight, milk production and litter size, sex, nutrition and maturing rate (Edey, 1983 and Boggs and Merkel, 1993). Mainly, the growth rate of kids was influenced by the energy level offered to the doe during lactation (Sibanda *et al.*, 1999). Birth weight of kids is regarded as one of the most important contributory factors for improving growth performance, adult body weight, kids viability, and hence a determinant factor for overall productivity (Boggs and Merkel, 1993 and Husain *et al.*, 1996).

Moreover, serum proteins of kids have a great effect on viability. Kaneko (1997) and Mellado *et al.* (2008) confirmed that kids with high serum protein during the first two days of life have lower morbidity and death rates.

Immunity and growth of neonates are mainly depending on total proteins. In the newly born animals, this factor comes mainly from the mother's colostrum (Chen *et al.,* 1999).

The adaptation and development of the neonates' organs to the new environment has a vital importance for the continuity of their life (Ocak *et al.*, 2009). In this context, initiation of consistent breathing, alteration in lungs and gas exchange, alteration of the circulatory pattern and regulation of temperature are considered of vital significance in order to ensure the smooth transition of newborn from uterine to neonatal life (Leone and Finer, 2006). Lung, the essential organ of respiratory system, is susceptible to many infectious and non-infectious agents causing various pathological conditions in farm animals. Among these diseases, pneumonia either acute or chronic can cause death leading to excessive economic loss to the breeders (Ferdausi *et al.*, 2008). Exposure to cold weather is a major predisposing factor for pneumonia (Brogden *et al.*, 1998; Tibbo *et al.,* 2003).

The aim of this study was to determine the effects of colostrum, suckled milk and serum proteins of kids and does during the first month of life on kids of Shami and Baladi goats' mortality. Moreover, to investigate the incidence of pneumonia that greatly affect kid's mortality rate during neonatal period.

MATERIALS AND METHODS

Study location:

The current study was carried out at South Sinai Station, belonging to Desert Research Center, Egypt. The experiment was conducted during the first of September 2016 and lasted to the end of December 2017. The investigated parameters were recorded during the first month of kids' life from February to Marsh 2017.

Animals and management:

Twenty five adult does (18 months old) of each Shami and Baladi goats breed were used. The average body weight of Baladi does was (21.27 Kg), while that of Shami does was (35.35 Kg). All does were clinically examined then synchronized and naturally mated with a buck of the same breed. Animals were housed in semi open shaded pens. Animals were fed twice a day (08:00 and 14:00 h) on Berseem hay and concentrate feed mixture to cover their nutrient requirements during different physiological status according to Kearl (1982). The chemical compositions of feed stuffs were determined according to A.O.A.C. (1990) and presented in Table (1).

Table 1. Chemical composition (%) of experimental feed stuffs (as % on DM basis)

Ingredient	DM	OM	CP	EE	CF	NFE	Ash
Berseem hay	85.1	86.85	12.09	1.36	27.57	45.83	13.15
Concentrate feed mixture	91.42	88.61	15.61	3.01	16.33	53.66	11.39

DM: dry matter, OM: organic matter, CP: crude protein, EE: ether extract: CF: crude fiber, NFE: nitrogen free extract.

All obtained kids were housed with their mothers during the entire study period (one month) and fed only with colostrum and maternal milk. Kids' mortality was determined during the first month of birth.

During the experimental period, average ambient temperature and relative humidity were continuously recorded using a hygro-thermometer. The temperature-humidity index (THI) was then calculated according to Piccione *et al.* (2011) with the following equation:

THI (°C) = tbs – (0.55 – 0.55 φ/100) (tbs – 14.4)

where:

tbs = dry-bulb temperature (°C),
φ = Relative Humidity (%).

The environmental conditions are given in Figure (1)

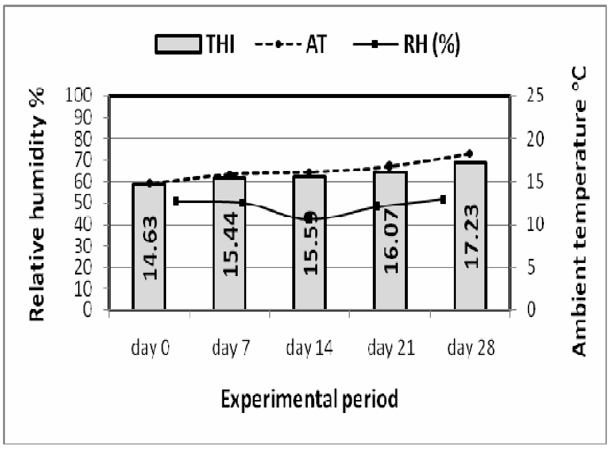

Fig. 1. Graphical representation of the air temperature, temperature humidity index (THI) (expressed in °C), and relative humidity (expressed in %), recorded during experimental period

Blood collection:

During the first month after parturition, once every week in the morning (8:00 a.m.) 10 ml of blood were composed from the jugular vein of each doe in vacuum tubes. The first sampling in the kids (only 5 ml of blood) was performed a few hours after the colostrum consumption. The tubes were centrifuged at 3,000 rpm for 10 min and the serum samples stored in a freezer for subsequent biochemical analysis.

Live body weight:

Kids were weighted immediately after parturition and then every week early after the morning suckling.

Milk yield and composition:

Colostrum samples were taken from all does at the first three days post-partum then chemically analyzed. Daily milk yield DMY (ml) was estimated from all does in both groups at the first week of kidding just after colostrum days and then once a week up to 4 weeks. Does were kept away from their kids for 12 h (overnight), and then one teat was hand milked. So, DMY was recorded as amount of milking milk multiplied by 4. Chemical composition of milk in terms of fat, protein, lactose, total solids (TS) and solids not fat (SNF) was determined using milk scan (Bently-Belguim).

Determination of colostrum immunoglobulin:

Immunoglobulin M (IgM) was determined in colostrum and serum using kits provided by Abbott Laboratories Company, USA.

Determination of serum total protein concentration:

Total proteins were determined in the serum using kits provided by Diamond Diagnostics Company, Egypt.

Determination of serum protein fractions:

Protein fractions were determined in the serum using protein electrophoresis on agarose gels kits provided by Hellabio Diagnostics Company.

Lung histopathological examination:

Dead kids were dissected immediately and lungs were collected. Lung samples were fixed in 10% buffered formalin and embedded in paraffin-wax. Sections were stained with haematoxyline and eosin (Drury and Wallington, 1976) for histopathological studies and Masson trichrome stain (Carson, 1990) for collagen determination.

Statistical analysis:

Results were presented as mean ±SE. A two-way repeated analysis of variance was used to establish statistical differences between mean values of the considered parameters in the first month postpartum. All the measurements were analyzed by generalized linear model using statistical software Minitab 12.1 (SAS, 2004).

RESULTS AND DISCUSSION

1. Mortality rate of kids during neonatal period:

One hundred and one kids (39 Baladi and 62 Shami) were monitored up to 30 days of their age. Forty four (9 Baladi and 35 Shami) died before they were 30 days old (Figure 2). Age of the kids in weeks had significant effect (P<0.05) on mortality rate. Out of 44 dead kids a 21 (47.72%) deaths were recorded during the first week of their age. The mortality percentage decreased significantly during the following 3 weeks (29.54, 13.63 and 9.09% respectively). Conversely, Petros *et al.* (2014) found no significant difference regarding the number of deaths among the first 4 weeks of kid's life.

The overall death rate in this study was significantly affected by the breed as it was 23.07% in Baladi kids, while was 56.45% in Shami kids.

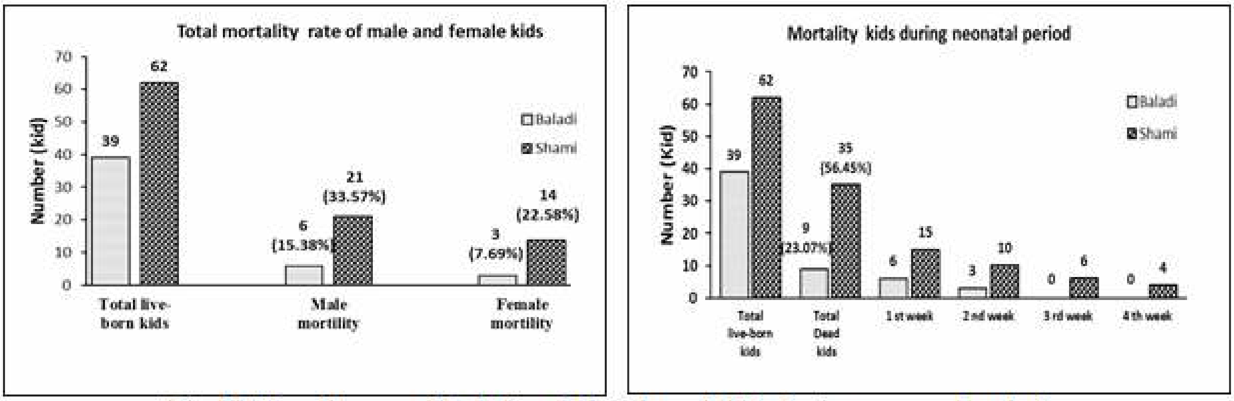

Fig. 2. Mortality rate of Baladi and Shami goat's kids during neonatal period

The results presented that male kids recorded higher (P<0.05) mortality rate than female ones (15.38% vs. 7.69% in Baladi kids and 33.57 % vs. 22.58% in Shami kids). The main reason for death might be attributed to low birth weight and respiratory disease. Lower weight under cold stress led to more loss of body heat due to the higher body surface to body weight ratio. In agreement, Perez-Razo *et al.* (1998), Aganga *et al.* (2005) and Hailu *et al.* (2006) documented a higher mortality for male kids compared to females. On the other hand, Debele *et al.* (2011) reported higher death rates in females than males in Arsi-Bale kids kept in a similar environment while the effect of gender on pre-weaning mortality was not recorded according to the works of Mtenga *et al.* (1993), Awemu *et al.* (1999) and Petros *et al* (2014).

2. Body weight changes and growth rates in kids during neonatal period:

It was stated that the birth weight and growth rate of animals are determined not only by genetic potential but also by environmental and maternal factors (Mandal *et al.,* 2006). Body weights and growth rates in pre-weaning are regularly considered as early signs of the late growth and economic benefit and can affect body weight at puberty and at first kidding (Portolano *et al.*, 2002 and Hanford *et al.*, 2006).

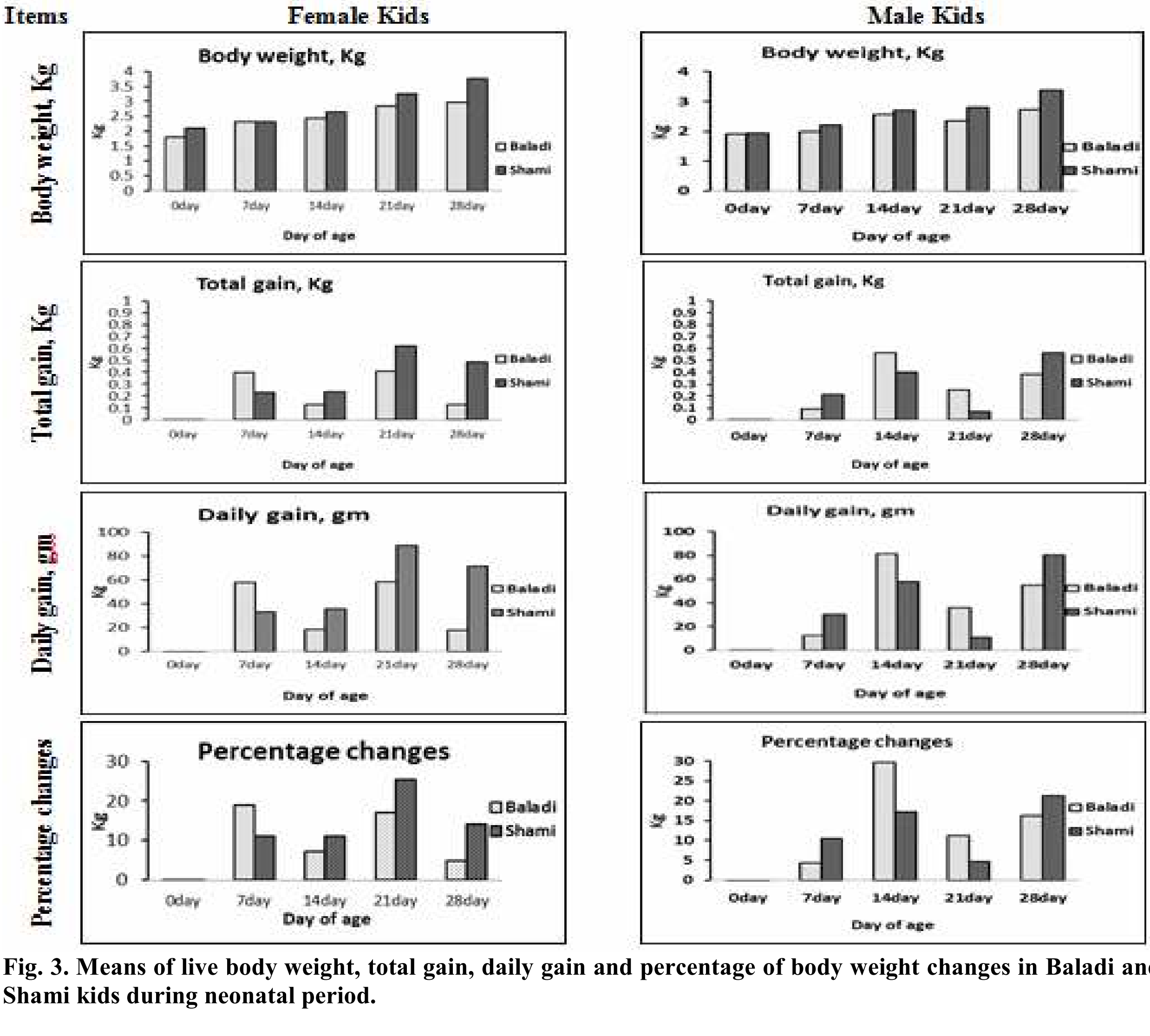

Fig. 3. Means of live body weight, total gain, daily gain and percentage of body weight changes in Baladi and Shami kids during neonatal period.

The overall mean birth weights of female kids of Baladi and Shami goats were 2.42 and 2.78 Kg with significant differences (P<0.01). For male kids birth weights were 2.39 and 2.48 kg respectively without significant differences (Figure 3). Male kids' birth weight was significantly lower than female kids. These results were contrary to several reports recording higher birth weight of male than female kids (Gubartalla *et al.*, 2002; ELimam *et al.*,2007 and Bushara *et al.,* 2013). On the other hand, Hanford *et al.* (2006) reported that there was no significant difference in birth weight due to sex of kids. These differences between author's results might be due to breed differences and management. Baladi male kids showed the lowest birth weight (2.39 kg) and the highest percentage mortality rate (33.33%). Kid's birth weight was found to have a significant effect on kids' mortality (Debele *et al.*, 2011) and final economic benefit (Portolano *et al.,* 2002 and Hanford *et al.,* 2006).

The rate of change in live body weight (LBW) for Baladi and Shami was respectively 9.67 vs. 11.81% for females, while was 14.12 vs. 10.57 % for males, with the differences being significant (P<0.01). However, there was no significant difference in average daily gain (g/day) between Baladi and Shami kids during the first 30 days of age. In accordance, Khazaal (2009) reported that average daily gain (ADG) of kids was similar between Shami and Saanen during the first 90 days of age (suckling period).

It was apparent that Shami female kids had the highest birth weight, growth rate and final LBW. Baladi male kids that could stay alive compensated the lower birth weight by high relative growth rate and attained the same final LBW as Shami males.

3. Colostrum immunoglobulin M (IgM) concentration and composition:

Previous studies quantified that in colostrum, the concentrations of protein, sodium and chloride are higher, while potassium and lactose concentrations are lesser as compared to milk. Besides, colostrum also contains high concentrations of immunoglobulins that give maternal immunity to the neonates (Arguello *et al.*, 2004).

Analysis of variance (Table 2) revealed that goat breed and day of age and their interactions affected (P<0.01) colostrum IgM concentration. The overall mean of colostrum IgM was higher (P<0.01) in Baladi (0.46 mg/ml) than in Shami does (0.39 mg/ml). The level of IgM gradually increased (P<0.05) during the first 3 days post-partum (0.37, 0.44 and 0.47 mg/ml respectively). The level of colostrum IgM in Shami does was very low at the first day (0.37 mg/ml) then increased within the second and third days to be comparable to that of Baladi does, which made the significant interaction Br X D.

Table 2. Colostrum composition and its IgM content in Baladi and Shami does

Item	Breed	Days of age			Overall	±SE		
		1st day After Birth	2nd day After Birth	3rd day After Birth		Br	D	Br x D
IgM, mg/ml	Baladi	0.45^{ab}	0.46^{ab}	0.48^{a}	0.46^{A}			
	Shami	0.30^{c}	0.42^{b}	0.46^{ab}	0.39^{B}	0.01^{**}	0.01*	0.01^{*}
	Overall	0.37^{B}	0.44^{A}	0.47^{A}				
Fat, %	Baladi	8.56^{a}	7.66^{ab}	7.15^{ab}	7.79^{A}			
	Shami	5.56^{ab}	5.48^{ab}	4.70^{b}	5.25^{B}	0.37^{**}	0.45^{NS}	0.64^{*}
	Overall	7.06	6.57	5.93				
Protein %	Baladi	5.96	4.89	5.05	5.30^{A}			
	Shami	4.47	4.45	4.41	4.44^{B}	0.19^{**}	0.23^{NS}	0.33^{NS}
	Overall	5.21	4.67	4.73				
Lactose %	Baladi	6.23	6.37	6.94	6.51			
	Shami	5.42	7.40	7.39	6.74	0.36^{NS}	0.44^{NS}	0.63^{NS}
	Overall	5.82	6.88	7.17				
Ash %	Baladi	1.33	0.93	1.93	1.40			
	Shami	0.83	1.100	1.10	1.01	0.29^{NS}	0.35^{NS}	0.50^{NS}
	Overall	1.08	1.01	1.51				
SNF %	Baladi	16.19	11.60	15.74	14.51			
	Shami	9.88	13.50	13.35	12.24	2.05^{NS}	2.51^{NS}	3.55^{NS}
	Overall	13.03	12.55	14.54				
TS pg/ml	Balabi	23.69	19.60	23.04	22.11			
	Shami	14.42	18.92	19.15	17.49	2.41^{NS}	2.95^{NS}	4.18^{NS}
	Overall	19.05	19.26	21.09				

a, b = Values in the same column or row within certain trait with different superscripts are significantly different (P< 0.05).
A, B = Values with different letters on the same row differ at (P<0.05). ***A, B* = Values with different letters on the same column are significantly different (P<0.05).** **NS non-significant, * P<0.05 , ** P<0.001**

For the other components, only fat and protein percentages were affected significantly by breed. The overall means for fats % and proteins % were significantly higher in colostrum of Baladi than Shami does (7.79 vs. 5.30% for fat and 5.25 vs. 4.44% for protein). Colostrum of Baladi does had very high fat content at the first day post-partum (8.56%) then decreased to stable level during the 2nd and 3rd days, while that of Shami does were nearly constant during this period. This trend differences what made significant interaction Br X D for fat%. It was clear that Baladi kids obtained higher energy and protein from the first day of their life. These breed differences in colostrum composition might explain partially the higher mortality rate in Shami kids.

The ingesting of colostrum by the progeny of ruminants has a essential role in passive immune transfer and in the survival rate of neonates (Stelwagen *et al*., 2009 and Hernández-Castellano *et al*., 2014), as they are born hypo-gammaglobulinemic. Nevertheless, the amount of colostrum produced by the dam and its composition can be affected by several factors such as nutrition or litter size (Banchero *et al*., 2004). It was recognized that kids fed an inadequate amount of colostrum in the first times of life are more susceptible to disease and mortality (Ahmad *et al*., 2000; Da Nobrega *et al*., 2005 and Nowak and Poindron, 2006). Accordingly, management in these periods is very important for final animal performance (Massimini *et al*., 2007 and Mastellone *et al*., 2011).

4. Milk yield and composition during the first month after parturition

Both breed and days after parturition had a significant effect on milk yield (Table 3).The overall mean of milk yield for Shami does (1038.57 ml) was higher (P<0.01) than that of Baladi does (578.71 ml). Milk yield of both breeds recorded the highest values in day 14 after parturition (650.00 ml/day for Baladi and 1288.57 ml/day for Shami). After attaining the peak, milk yield decreased (P<0.01) gradually till the end of the neonatal period (544.28 ml/day for Baladi and 903.57 ml/day for Shami). The same trend was found in Awassi (Mousa, 2011) and Barki sheep (Ibrahim, 2014) whose daily milk yield reached the peak at the 2nd week of lactation. The interaction Br X St was significant due to the wide range of change in Shami milk yield (889.28 – 1288.57 ml/day) as compared to that of Baladi does (551.42 – 650.00 ml/day). Khazaal (2009) reported that the average milk yield (from 60-240 days or from 0-300 days of lactation) was similar in both Shami and Saanen goat. Shami breed is distinguished in milk production, so it was preferred for Bedouins in Sinai Province.

Table 3. Milk yield and composition of Baladi and Shami does during the experimental period

Item	Breed	Experimental period: 4 days After Birth	7 days After Birth	14 days After Birth	21 days After birth	28 days After Birth	Overall	±SE: Br	D	Br x D
Milk Yield, ml	Baladi	551.4^{f}	580.0^{f}	650.0^{e}	567.8^{f}	544.2^{f}	578.7^{B}	6.39^{**}	10.1^{**}	17.03^{**}
	Shami	889.2^{d}	1087.4^{b}	1288.5^{a}	1024.2^{c}	903.5^{d}	1038.5^{A}			
	Overall	720.3^{D}	833.6^{B}	969.3^{A}	796.1^{C}	723.9^{D}				
Fat, %	Baladi	3.66^{ab}	4.01^{ab}	4.19^{ab}	4.66^{ab}	4.96^{a}	4.29^{A}	0.17^{**}	0.44^{NS}	0.39^{*}
	Shami	3.38^{b}	3.44^{b}	3.55^{ab}	3.69^{ab}	3.47^{ab}	3.50^{B}			
	Overall	3.52	3.72	3.87	4.17	4.21				
Protein, %	Baladi	6.10^{a}	5.39^{b}	4.15^{cd}	4.01^{cd}	3.70^{d}	4.68	0.10^{NS}	0.16^{**}	0.23^{**}
	Shami	6.19^{a}	5.10^{bc}	4.19^{cd}	4.09^{cd}	3.90^{d}	4.69			
	Overall	6.15^{A}	5.25^{B}	4.17^{C}	4.04^{C}	3.08^{C}				
Lactose, %	Baladi	4.89^{a}	4.69^{ab}	4.44^{ab}	4.41^{ab}	4.33^{ab}	4.57^{A}	0.16^{**}	0.25^{NS}	0.40^{*}
	Shami	4.55^{ab}	4.12^{ab}	3.68^{ab}	3.69^{ab}	3.44^{b}	3.87^{B}			
	Overall	4.72	4.40	4.06	4.05	4.88				
Ash, %	Baladi	0.79	0.62	0.72	0.60	0.60	0.66	0.04^{NS}	0.66^{NS}	0.09^{NS}
	Shami	0.71	0.66	0.63	0.70	0.72	0.64			
	Overall	0.75	0.64	0.67	0.65	0.66				
SNF %	Baladi	9.65^{b}	9.22^{bc}	8.86^{cd}	8.35^{de}	7.99^{e}	9.81	0.07^{NS}	0.12^{**}	0.17^{**}
	Shami	10.21^{a}	9.12^{bc}	8.53^{de}	8.32^{de}	8.22^{e}	8.88			
	Overall	9.93^{A}	9.17^{B}	8.69^{C}	8.33^{CD}	8.10^{D}				
TS pg/ml	Baladi	15.44^{a}	14.71^{ab}	13.50^{abc}	13.68^{abc}	13.59^{abc}	14.19	0.26^{NS}	0.41^{*}	0.58^{**}
	Shami	14.83^{ab}	13.32^{abc}	12.05^{cd}	12.17^{cd}	11.53^{d}	12.77			
	Overall	15.14^{A}	14.02^{AB}	12.77^{B}	12.92^{B}	12.56^{B}				

a, b = Values in the same column or row within certain trait with different superscripts are significantly different (P< 0.05).
A, B = Values with different letters on the same row differ at (P<0.05). ***A, B*** **= Values with different letters on the same column are significantly different (P<0.05). NS = non-significant, * P<0.05, ** P<0.001**

Baladi does displayed higher (P<0.01) concentration of milk fat and lactose than Shami ones. In contrast, Roger *et al.* (2011) reported that milk sugar is the major osmotic regulator of milk whereas a strong positive correlation exists between lactose synthesis and milk yields. These differences among genotypes might indicate different physiological adaptation mechanisms under the same nutritional conditions, especially during pregnancy as stated by Silanikove (2000) and Macciotta *et al.* (2011). In addition, these two parameters showed significant interaction Br X St. This was due to the differences between the two breeds in these two parameters become wider with advancing age.

No significant differences were found between the two breeds in the other milk components (protein%, ash%, SNF% and TS pg/ml). However, stage of lactation had significant effect on protein%, SNF% and TS mg/ml. These three components gradually decreased significantly during lactation periods. However, Gantner and Kompan (2012) found that the number of secretory cells in the udder of goats decreased as lactation months advanced, but udder cells activity remained with reference to total solids (TS) content.

In general, Shami kids gained larger amount of milk, but Baladi kids acquired more energy. High energy intake could help overcoming the cold stress prevailing during the experimental period (Fig. 1).

5. Serum total proteins and its fractions of does during the experimental period:

Data in Table (4) showed that mean total serum proteins during the experimental period were nearly the same in Baladi and Shami does (7.79 vs. 8.14 g/dl). Baladi does had significant higher values of serum albumin (57.83 vs. 53.91%), alpha-2 globulins (9.10 vs. 8.74%) and A/G ratio (1.39 vs. 1.37), while had significant lower values of serum alpha-1 globulins (1.65 vs. 3.30%), beta globulins (6.57 vs. 6.69%) and gamma globulins (27.06 vs. 27.33%) than Shami does.

Table 4. Means of serum total protein and its fractions in Baladi and Shami does during experimental period

Item	Breed	Experimental period: Immed. after Birth	7 days After Birth	14 days After Birth	21 days After birth	28 days After Birth	Overall	±SE: Br	D	Br x D
Total Protein g/dl	Baladi	7.28	7.46	7.90	8.04	8.29	7.79			
	Shami	7.34	7.98	8.21	8.48	8.67	8.14	0.16 ^{NS}	0.32*	0.48 ^{NS}
	Overall	7.31^{BCD}	7.72^{ABC}	8.05^{ABC}	8.26^{AB}	8.48^{A}				
Albumin %	Baladi	52.08^{g}	67.31^{a}	51.95^{g}	54.56 ^{f}	61.01^{b}	57.38^{A}	0.08**	0.13**	0.18**
	Shami	55.71^{e}	57.05^{d}	48.81^{i}	57.72 ^{f}	50.27^{h}	53.91^{B}			
	Overall	53.89 ^{D}	62.18^{A}	50.38^{E}	56.14^{B}	55.64^{C}				
Alpha-1 G %	Baladi	1.54 ^{g}	2.20 ^{e}	1.91 ^{f}	1.26 ^{i}	1.37 ^{h}	1.65 ^{B}	0.02**	0.02 **	0.03**
	Shami	3.86 ^{a}	2.74 ^{d}	2.71 ^{d}	3.66 ^{b}	3.49 ^{c}	3.30 ^{A}			
	Overall	2.70 ^{A}	2.44 ^{B}	2.28 ^{C}	2.46 ^{B}	2.43 ^{B}				
Alpha-2 G %	Baladi	10.64 ^{a}	9.01 ^{e}	9.12 ^{c}	7.72 ^{g}	9.03 ^{e}	9.10 ^{A}	0.01**	0.02**	0.03**
	Shami	9.09 ^{c}	8.54 ^{e}	9.77 ^{b}	7.74 ^{g}	8.58 ^{f}	8.74^{B}			
	Overall	9.86 ^{A}	8.77 ^{C}	9.44 ^{B}	7.73 ^{D}	8.80 ^{C}				
Beta G %	Baladi	9.16 ^{d}	9.01 ^{c}	9.49 ^{a}	2.26 ^{j}	2.95 ^{i}	6.57 ^{B}	0.01**	0.02 **	0.03**
	Shami	8.49 ^{d}	6.97 ^{f}	7.90 ^{e}	5.72 ^{g}	4.38 ^{h}	6.69 ^{A}			
	Overall	8.82 ^{A}	7.99 ^{C}	8.69 ^{B}	3.99 ^{D}	3.66 ^{E}				
Gamma G %	Baladi	26.55^{e}	21.46^{j}	27.50^{d}	34.19^{a}	25.64^{f}	27.06^{A}			
	Shami	22.81^{i}	24.67^{h}	30.79^{c}	25.13^{g}	33.26^{b}	27.33^{B}	0.01*	0.03 **	0.04**
	Overall	24.68 ^{D}	23.06 ^{E}	29.14 ^{C}	29.66 ^{A}	29.45^{B}				
A/G ratio	Baladi	1.08 ^{g}	2.05 ^{a}	1.08 ^{g}	1.20 ^{f}	1.56 ^{b}	1.39 ^{A}	0.01**	0.01**	0.01**
	Shami	1.25 ^{e}	1.32 ^{d}	0.95 ^{l}	1.36 ^{c}	1.01 ^{h}	1.17 ^{B}			
	Overall	1.16 ^{C}	1.68 ^{A}	1.01 ^{D}	1.28 ^{B}	1.28 ^{B}				

a, b = Values in the same column or row within certain trait with different superscripts are significantly different (P< 0.05).
A, B = Values with different letters on the same row differ at (P<0.05). ***A, B*** **= Values with different letters on the same column are significantly different (P<0.05). NS = non-significant, * P<0.05, ** P<0.001**

Reproductive stage had a significant effect on serum total proteins and its fractions. Total proteins increased from 21st day and kept this high level to the 28th day. Bremmer *et al.* (2000) confirmed that the higher values of total protein in lactating ewes compared to dioestrus phase prove the high energy need due to milk synthesis especially during the early lactation. Reversely, El-Sherif and Assad (2001) found in lactating ewes a decline in plasma proteins with advancing lactation. Vihan and Rai (1983) reported a decrease in total proteins, albumin and globulin at parturition in sheep.

The values of albumin, alpha-1 globulins and gamma globulins percentages increased gradually and each reached its own beak then decreased again. Piccione *et al.* (2009) reported that serum albumin concentration significantly increased during the late pregnancy end of lactation and dry periods compared to dioestrus, pregnancy, post-partum and early lactation periods in ewes.

Values of alpha-2 globulins % of both breeds started and continued with high level but decreased suddenly at 21st day then returned to its normal one.

Values of beta globulins % of both breeds started at high level, but declined sharply from 21st day of lactation.

The decrease of proteins and its fraction might due to formation of colostrum, milk protein (casein) and antibodies. The differences between the two breeds in the serum content and fluctuation of protein fractions might reflect different pathways of protein transfer from dams to their offsprings.

6. Serum total protein and its fractions of kids during neonatal period:

Breed of kids had significant effect on serum protein and its fraction (Table 5). Shami kids had higher (P<0.01) values than Baladi ones in serum total protein (7.53 vs. 5.96 g/dl), albumin (61.94 vs. 56.36%), alpha-1 globulin (3.82 vs. 3.75%), beta globulin (12.13 vs. 0.26%) and A/G ratio (1.65 vs. 1.41). However, Baladi kids showed higher (P<0.01) values of serum alpha-2 globulins (11.61 vs. 8.87%) and gamma globulins (27.94 vs. 13.26%).

Serum total protein levels of both Baladi and Shami kids are comparable to the known goat's serum levels that stated by Djuricic *et al.* (2010).

Table 5. Means of serum total protein and its fractions of Baladi and Shami kids during neonatal period

Item	Breed	Experimental period					Overall	±SE		
		Immed. after Birth	7 days After Birth	14 days After Birth	21 days After birth	28 days After Birth		Br	D	Br x D
Total Protein g/dl	Baladi	5.37	6.16	6.07	5.97	6.21	5.96^{B}			
	Shami	8.15	7.80	8.42	6.91	6.36	7.53^{A}	0.22**	0.32^{*}	0.50^{NS}
	Overall	6.76^{AB}	6.98^{AB}	7.24^{A}	6.44^{AB}	6.29^{B}				
Albumin %	Baladi	37.56^{i}	51.85^{h}	60.29^{e}	64.26^{c}	67.88^{a}	56.36^{B}			
	Shami	57.14^{g}	64.58^{b}	58.95^{f}	61.29^{d}	67.77^{a}	61.94^{A}	0.032^{**}	0.051^{**}	0.073^{**}
	Overall	47.35^{E}	58.21^{D}	59.62^{C}	62.77^{B}	67.82^{A}				
Alpha-1 G %	Baladi	2.30^{h}	4.26^{e}	4.34^{d}	5.14^{a}	2.91^{g}	3.75^{B}			
	Shami	4.46^{c}	4.18^{f}	4.57^{b}	1.21^{i}	4.33^{d}	3.82^{A}	0.006^{**}	0.009^{**}	0.015^{**}
	Overall	3.38^{D}	4.22^{B}	4.45^{A}	3.17^{E}	3.62^{C}				
Alpha-2 G %	Baladi	5.95^{i}	12.14^{d}	13.95^{c}	14.75^{b}	11.27^{f}	11.61^{A}			
	Shami	6.52^{h}	7.52^{g}	11.87^{e}	15.37^{a}	3.09^{j}	8.87^{B}	0.009^{**}	0.014^{**}	0.020^{**}
	Overall	6.23^{E}	9.82^{C}	12.91^{B}	15.06^{A}	7.18^{D}				
Beta G %	Baladi	1.06^{e}	0.07^{g}	0.13^{f}	0.04^{h}	0.01^{i}	0.26^{B}			
	Shami	10.16^{d}	12.62^{b}	11.14^{c}	10.14^{d}	16.63^{a}	12.13^{A}	0.003^{**}	0.005^{**}	0.008^{**}
	Overall	5.61^{C}	6.34^{B}	5.63^{D}	5.08^{E}	8.32^{A}				
Gamma G %	Baladi	53.10^{a}	31.66^{b}	21.27^{d}	15.78^{f}	17.90^{e}	27.94^{A}			
	Shami	21.69^{c}	11.08^{i}	13.45^{g}	11.96^{h}	8.16^{j}	13.26^{B}	0.003^{**}	0.005^{**}	0.008^{**}
	Overall	37.39^{A}	21.37^{B}	17.36^{C}	13.87^{D}	13.03^{E}				
A/G ratio	Baladi	0.60^{g}	1.07^{f}	1.51^{c}	1.79^{b}	2.11^{a}	1.41^{B}			
	Shami	1.33^{e}	1.82^{b}	1.43^{d}	1.58^{c}	2.10^{a}	1.65^{A}	0.01^{**}	0.01^{**}	0.02^{**}
	Overall	0.96^{D}	1.44^{C}	1.47^{C}	1.68^{B}	2.10^{A}				

a, b = Values in the same column or row within certain trait with different superscripts are significantly different (P< 0.05).
A, B = Values with different letters on the same row differ at (P<0.05). ***A, B*** **= Values with different letters on the same column are significantly different (P<0.05). NS = non-significant, * P<0.05, ** P<0.001**

Serum proteins of kids have a great influence on viability. Kaneko (1997) and Mellado *et al.* (2008) confirmed that kids with higher protein concentration than 800 mg/dl during the first two days of life have lower mortality and morbidity rates than kids with lower serum protein levels. This is because the total proteins and immunoglobulin fractions in serum are necessary for the neonate immunity and growth (Chen *et al.*, 1999 and Mellado *et al.*, 2008). In the present study all kids had very high level of serum total protein than 800 mg/dl, which mean that this parameter in this study might have little indication to mortality rates. It appeared due to the role of immune globulins in kids' immunity that the most important indicator for viability is globulin fractions.

Reproductive stage had significant effect on total proteins and its fractions. Each breed had its own fluctuation of protein and its fraction throughout the first month of their life. To be demonstrated more clearly, these fluctuations were expressed in Figure (4). These differences between breed's fluctuations in all serum protein fractions and A/G ratio along the neonatal period made the significant interaction Br X St (Table 5). It seemed that each breed utilize specific types of immunoglobulin. Alpha-1 globulin concentration was nearly the same in both breeds in spite of significant difference. Bauman and Gaudie (1994) mentioned that α1-acid glycoprotein concentration increases during infection or inflammation, as well as concentrations of other acute phase proteins

.

In the present study serum albumin levels showed gradual and fast increases to reach its beak at day 28th of kids' life. Albumin is the most represented protein in the milk and in colostrum (Rufibach *et al.*, 2006 and Mellado *et al.*, 2008). In previous studies (Kaneko, 1997 and Thrall, 2004), the albumin levels showed a significant decrease in the first 14 days after birth, with a subsequent increase. This trend reflects the albumin's medium half-life that ranges from 14 to 16 days in ruminants, after which period the liver is responsible for albumin synthesis.

Likewise, beta globulins % showed gradual but slowly increases throughout the first month of kids' life. Under environmental stress and changes in feed intake, the most important proteins included in beta fractions are the complement and the C-reactive protein, which like the acute phase proteins are involved in the environmental stress response (Bernabucci *et al.*, 2009).

Serum gamma-globulins showed a decline with advancing age in both breeds, but more obvious in Baladi kids (Table 4 and Fig.3). The fraction of gamma-globulin is mainly composed of immunoglobulins (Kaneko, 1997; Thrall, 2004 and Alberghina *et al.*, 2010). In the adult, the lymphoid tissues create immunoglobulins as a response to antigenic inspiration, but in the neonatal period these are provided exclusively by colostrum so that the passive immunity can be acquired (Thrall, 2004).

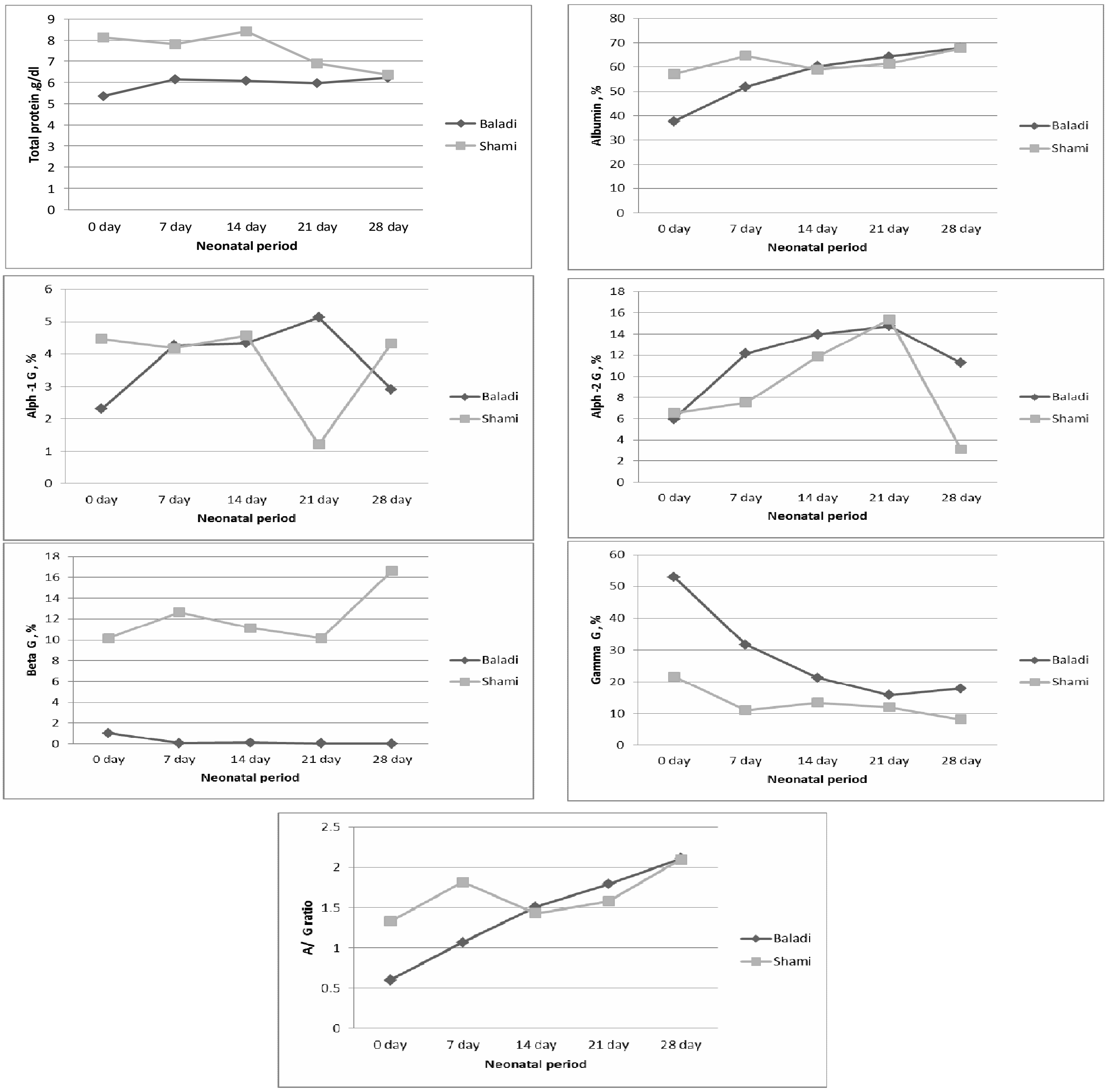

Fig. 4. Fluctuation of serum total proteins and its fractions throughout the first month of life of Baladi and Shami kids

7. Histological results :

A total of 35 kid's lungs (6 Baladi and 29 Shami) were examined, 30 (4 Baladi and 26 Shami) were found to be apparently abnormal and were collected for pathological investigations. The prevalence of pneumonia recorded 20 % (6 out of 30 lungs).The presence of hemorrhages and congestion was detected in some cases (Figures 6, 9 and 12). There were also peribronchitis, perivasculitis and peribronchial vasculitis (Figures 7,8 and 10) . In addition, the prevalence of broncho-pneumonia (bronchitis) was recorded (30%, 9 out of 30 lungs). Some lungs showed exudates and infiltration of inflammatory cells in the bronchi as well as in the interstitial tissue (Figure 12). The prevalence of bronchoectasia was also recorded (30%, 9 out of 30 lungs) (Figures 13 and 14).

Furthermore, the prevalence of emphysema in lung was recorded (20 %, 6 out of 30 lungs). Intra alveolar emphysema with giant alveoli formation was observed, many alveoli were distended due to rupture of thin alveolar walls (Figures 5 and 11).

From another angel , in all dissected Baladi and Shami kids, lungs showed marked stainobility of collagenous fibers , peribronchial and perivascular accompanied by accumulated infiltrating cells (Figures 15 and 16).

The lung lesions grossly recorded 85.71% in kids (30 out of 35 lungs examined). Debien *et al.* (2013) determined the main causes of mortality, with a special focus on caseous lymphadenits as a cause of death or wasting in caprine herds from Quebec and found that pneumonia was the second most frequent cause of mortality (13.8%) of goats .Two studies in Mexico, in which causes of mortality were investigated by necropsy, found pneumonia to be responsible for the death of goats in 18% and 55%. Goats were affected from 46 to 90 days and from 1 to 3 years of age, respectively (Mellado *et al.*, 1991 and Ramirez-Bribiesca *et al.*, 2001).

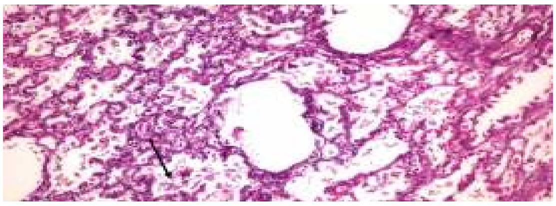

Fig. 5. Lung section of one day old Baladi kid showing intra alveolar emphysema with giant alveoli formation (arrow) (H &E X 200).

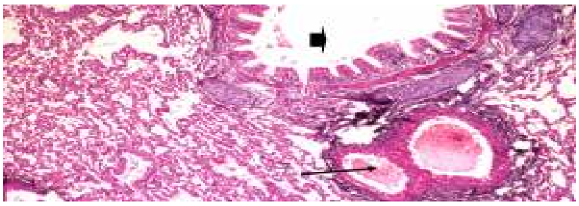

Fig. 6. Lung section of stillbirth Shami kid showing bronchopneumonia with inflammatory reaction in the bronchi (arrow head), and interstitial tissue (arrow), vascular congestion and increased leucocytes (H&E X 200).

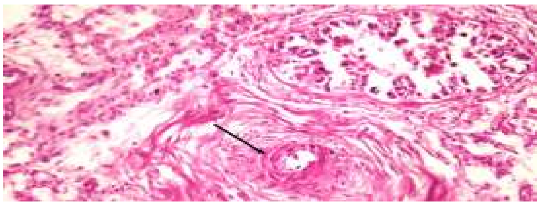

Fig. 7. Lung section of 4 days old Shami kid showing peribronchial vasculitis (arrow) (H&E X 400).

Fig. 8. Lung section of one day old Shami kid showing congested peribronchial blood vessel (arrow) (H&E X 200).

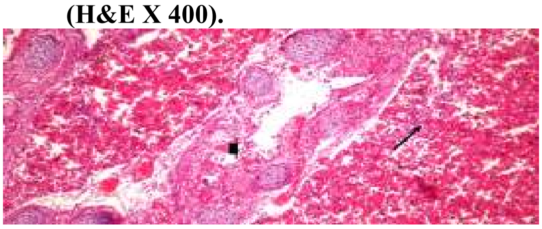

Fig. 9. Lung section of stillbirth Shami kid showing bronchopneumonia with inflammatory reaction in the bronchi (arrow head), and interstitial tissue (arrow) (H&E X 200).

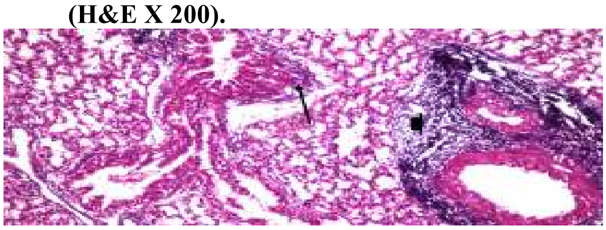

Fig. 10. Lung section of 2 days old Shami kid showing peribronchits (arrow) and perivasculitis (arrow head) (H&E X 200).

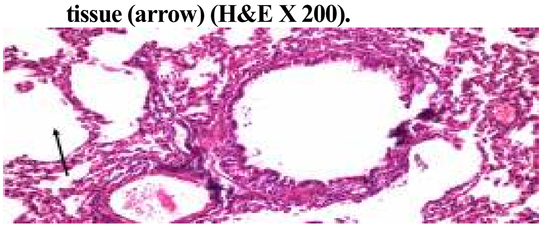

Fig. 11. Lung section of 4 days old Baladi kid showing intra alveolar emphysema with giant alveoli formation (arrow) (H&E X 200).

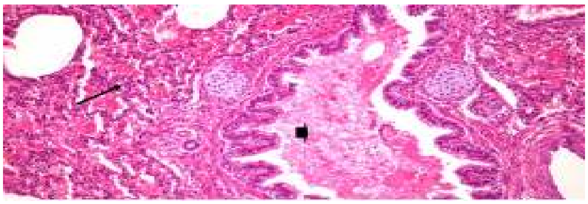

Fig. 12. Lung section of 5 days old Shami kid showing bronchopneumonia with inflammatory reaction in the bronchi (arrow head), and interstitial tissue (arrow) (H&E X 200).

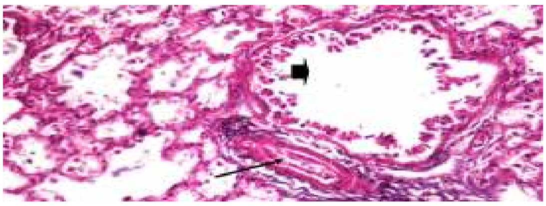

Fig. 13. Lung section of 5 days old Shami kid showing bronchoectasia (arrow head), dilated peribronchial blood vessel (arrow) and thickened of alveolar walls (H&E X 200).

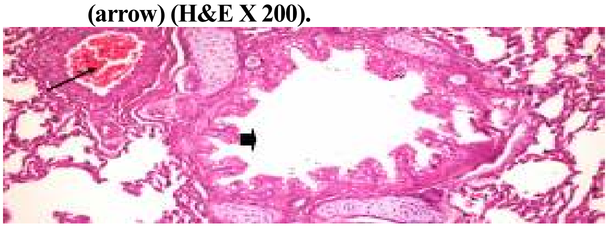

Fig. 14. Lung section of one day old Shami kid showing bronchoectasia (arrow head) and congested blood vessel with emphysema (arrow) (H&E X 200).

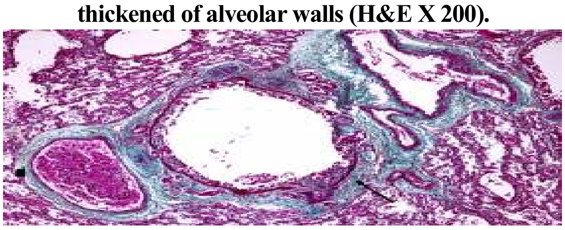

Fig. 15. Lung section of all dissected kids showing marked staining collagenous fibers , peribronchial (arrow) and perivascular (arrow head) (MT X 200).

Fig. 16. Lung section of all dissected kids showing collagenous fibers surrounding the congested interstitial blood vessel (arrow) (MT X 200).

Histopathologically, Rashid *et al.* (2013) found that the lung lesions were bronchopneumonia 30%, pneumonia 25% hemorrhagic pneumonia 20% emphysema 15%, purulent pneumonia 10% while, Ferdausi *et al.* (2008) reported that the lung lesions were pneumonia (6.67%), bronchopneumonia (3.33%), purulent pneumonia (5%), hemorrhagic pneumonia (3.33%).

Gonçalves *et al.* (2010) reported a severe respiratory disease in kids from primipara goats of the Saanen breed in which 21/91 kids died and there was a morbidity rate of 34% in the Alentejo region of Portugal. Histological sections of the lung revealed a suppurative bronchopneumonia with alveoli and bronchioles filled with variable proportions of neutrophils, macrophages, serofibrinous exudation, degenerated leukocytes, necrotic debris, and multifocal presence of aggregates of bacteria. Fibrinous pleuritis and severe distension of the interlobular septa by fibrin and oedema were also observed as well as occasional peribronchiolar lymphocytic accumulation.

Petros *et al.* (2014) summarized major causes of kid mortality identified during the study and their contribution to the total number of death. Mismothering was the most frequently suspected cause of mortality (26%); followed by pneumonia (20%), enzootic ataxia (18.5%), diarrhea (17%), unknown causes (7.7%), goat pox (6.2%) and predators (4.6%).

Exposure to cold weather is a major predisposing factor for bacterial pneumonia in sheep and goats. In Northern Ireland, where the majority of the sheep population is not provided with any form of shelter during winter, a significant correlation was found between rain/wind-chill and pneumonia (Brogden *et al.*,1998) . In Ethiopia, highly significant correlation coefficients were found between cold temperature and sheep pneumonia (Tibbo *et al.,*2003) . Warming lambs during the cold season is one of the recommended interventions to prevent mortality from pneumonia. Low temperatures, particularly in winter, have also been associated with increased incidence of pneumonia in pigs kept outdoors and in cattle, especially young calves (Bekele *et al.*,1992) .

Exposure of the animal body to cold and breathing cold air may alter the immunologic and local defenses against pulmonary infections and increase the numbers of bacteria inhaled into the lungs during normal breathing. Although these mechanisms grant biologic plausibility to the hypothesis that hypothermia is a risk factor for pneumonia in animals (Goodall *et al.,* 1993).

CONCLUSION

Immunoglobulins were available to both breeds of kids which might mean that they both had similar disease resistance. However, Baladi kids had higher level of Igm, fat% and protein% in colostrum than Shami ones. Shami kids were provided by more amount of milk, while Baladi kids obtained milk with higher Fat% and lactose content. Baladi kids might have the opportunity to make more metabolic heat production that helped them to cope with cold stress that prevailing during the experimental period and as a result showed little mortality percentage.

Exposure of neonates to cold stress induced a significant increase in the incidence of pneumonia which greatly affected kid's mortality rate during neonatal period.

The main recommendation from the results of this study is to arrange breeding season especially for Shami goats to obtain kids during warm months to avoid cold stress and incidence of pneumonia.

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دراسة تأثير بعض العوامل الفسيولوجية والهستوباثولوجية على نفوق جداء الماعز الشامى والبلدى خلال فترة حديثي الولادة

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صممت هذه الدراسة لمحاولة الوقوف على بعض الأسباب الفسيولوجية والمرضية لنسيج الرئة المؤدية الى إرتفاع معدل النفوق فى جداء الماعز الشامى مقارنة بالماعز البلدى كإحدى السلالات المحلية، وقد أجريت الدراسة بمحطة بحوث رأس سدر، بمحافظة جنوب سيناء، التابعة لمركز بحوث الصحراء، مصر. تم متابعة خمسون من امهات انثى الماعز (خمس وعشرون بلدى وخمس وعشرون شامى) خلال مراحل الحمل المختلفة وكذلك بعد الولادة تم متابعة الامهات والمواليد فى كلتا السلالتين لمدة شهر بعد الميلاد .و كان أهم ماتوصلت اليه هذه الدراسة ما يلى : بلغ معدل النفوق فى جداء الماعز البلدى خلال الشهر الاول من الميلاد ٢٣.٠٧% بينما سجل فى جداء الماعز الشامى ٥٦.٤٥% . تأثر معدل النفوق فى كلتا السلالتين معنويا بنوع المواليد حيث كان أعلى فى الذكور مقارنة بالإناث .كما أظهرت النتائج عدم وجود فرق معنوى فى أوزان المواليد الذكور بين كلتا السلالتين بينما ارتفع متوسط أوزان إناث المواليد الشامى معنويا مقارنة بأوزان إناث المواليد البلدي.كذلك ارتفعت نسبة التغير فى وزن الجسم لذكورمواليدالماعز البلدى معنويا مقارنة بذكورمواليد الماعز الشامى بينما كانت نسبة التغير فى وزن الجسم أعلى فى إناث مواليد الماعز الشامى مقارنة بمواليد الماعز البلدى . كما بينت النتائج تأثر مستوى الجلوبيولين المناعى (IgM) فى السرسوب بنوع سلالة الماعز (بلدى وشامى) والثلاث ايام الاولى بعد الولادة ، حيث كان أعلى معنويا فى سرسوب الأمهات البلدى مقارنة بسرسوب الأمهات الشامى .كذلك إرتفع مستوى الجلوبيولين المناعى (IgM) معنويا خلال الثلاث ايام الأولى بعد الولادة فى سرسوب كل من امهات الماعز البلدى والشامى . لم تظهر نوع سلالة الماعز وجود تأثير معنوى على مكونات السرسوب فيما عدا نسبة الدهون واللاكتوز حيث تأثرت معنويا بإختلاف سلالة الأمهات فكانت اعلى معنويا فى سرسوب الأمهات البلدى مقارنة بالامهات الشامى .ارتفع معدل انتاج اللبن فى الماعز الشامى ارتفاعا معنويا مقارنة بالماعز البلدى حيث بلغ متوسط انتاج اللبن للماعز الشامى ١٠٣٨.٥٧ مل/ اليوم بينما بلغ الإنتاج فى الماعز البلدى ٥٧٨.٧١ مل \ اليوم . أثرت فترة الإرضاع معنويا على محصول اللبن حيث سجل اعلى قيمة له فى اليوم الرابع عشر بعد الميلاد ثم بدأ فى الانخفاض تدريجيا حتى نهاية مدة الدراسة .لم يظهر اختلاف سلالة الماعز تاثيرا معنويا على نسبة البروتين و الرماد والمواد الصلبة الكلية والمواد الصلبة اللا دهنية فى اللبن بينما تأثرت نسبة الدهون واللاكتور معنويا.من ناحية اخرى تأثرت مكونات اللبن معنويا فى كلتا السلالتين خلال فترة الإرضاع . تأثر مستوى البروتين الكلى ومشتقاته للأمهات معنويا بإختلاف سلالة الماعز حيث ارتفع مستوى كل من البروتين الكلى والالبيومين وألفا -٢ جلوبيولين و جاما جلوبيولين و كذلك نسبة الالبيومين والجلوبيولين بينما انخفض كل من ألفا -١ جلوبيولين و بيتا جلوبيولين فى سيرم الأمهات البلدى مقارنة بالأمهات الشامى . كذلك أثرت الحالة الفسيولوجية معنويا على مستوى البروتين الكلى ومشتقاته فتأثر مستوى البروتين الكلى ومشتقاته لصغار الماعز معنويا بإختلاف السلالة حيث كان مستوى البروتين الكلى والالبيومين و ألفا -١ جلوبيولين وبيتا جلوبيولين و نسبة الالبيومين والجلوبيولين أعلى فى سيرم صغار الماعز الشامى بينما انخفض كل من ألفا -٢ جلوبيولين و جاما جلوبيولين عند مقارنتها بصغار الماعز البلدى . كذلك تأثر تركيز البروتين الكلى ومشتقاته معنويا خلال الشهر الأول من الميلاد حيث ارتفع كل من مستوى البروتين الكلى والالبيومين و ألفا -١ و ألفا -٢ جلوبيولين و بيتا جلوبيولين و نسبة الالبيومين والجلوبيولين تدريجيا بينما إنخفضت نسبة الجاما جلوبيولين خلال فترة مابعد الميلاد.أظهرت الدراسة النسيجية لرئات الجداء النافقة وجود بعض العلامات المرضية والتى تمثلت فى وجود احتقان ونزيف فى الاوعية الدموية ، تهتك النسيج المبطن للقصيبات الهوائية و جدر الأوعية الدموية حول القصيبات والتهاب القصيبات الهوائية مع تجمعات لألياف الكولاجين حول القصيبات الهوائية والأوعية الدموية وتهتك فى جدار الحويصلات الهوائية . الخلاصة:تعرض المواليد حديثى الولادة للإجهاد نتيجة لإنخفاض درجة الحرارة (البرودة) أثناء فترة التجربة أدى إلى زيادة الإصابة بالإلتهاب الرئوى والذى أدى إلى زيادة النفوق. كما ساعد إنخفاض مستوى الجلوبيولين المناعى فى لبن السرسوب لأمهات الماعز الشامى فى زيادة معدل نفوق المواليد.