ACTORS ASSOCIATED WITH PREGNANCY LOSSES IN FRIESIAN COWS RAISED UNDER EGYPTIAN CONDITIONS

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ABSTRACT

A total of 1,486 records for dairy Friesian cows from 2007–2015 were analyzed to investigation the factors associated with pregnancy losses or abortion raised under Egyptian conditions. The overall incidence of pregnancy losses was 9.89% in this study. The results showed that the cow age at the conceived insemination in Friesian cows having ≤16 and ≥ 96.1 months of age was significantly (P<0.01) associated with high incidence of pregnancy losses compared with that having 16.1 to 96 months. Also, extreme body weight at the conceived service was related to pregnancy losses, cows having **≤**400 and **≥**600 kg of live body weight showed higher percent (P<0.01) of pregnancy losses (13.51 and 20.59%) compared to7.94 and 8.69% in cows weighted 401 to 499 and 500 to 599 kg respectively. The cow's parity was significantly (P<0.01) associated with incidence of pregnancy losses, cows had 4th, 5thand ≥6 parities were higher than that of 1st, 2nd and 3rd parities. Summer season recorded highest incidence of pregnancy losses compared to the other seasons. In addition, pregnancy losses was higher (P<0.01) in cows had high milk yield (≥20 kg daily milk daily) than cows inlow and moderate milk yield (**≤**6 to 15~20 kg daily milk daily) respectively. Nutrition system-1 showed significantly higher (P<0.01) association with the incidence of pregnancy loss compared to nutrition system-2. Either somatic cell count (SCC) or mastitis infection at insemination in Friesian cows were significantly (P<0.01) high associated with incidence of pregnancy losses in cows having >400,000 SCC\ml of milk than that having ≤ 200 and ≤ 400000 SCC\ml of milk.

Keywords:* *Friesian cows, pregnancy loss, age, parity, milk yield, mastitis.

INTRODUCTION

Embryo loss in dairy cows can be classified as early embryonic mortality when cows come back into heat within 25 days after fertilization, and late embryonic mortality (LEM) when losses occur between Days 25 and 45 of gestation (Humblot, 2001). However, abortion as a loss of the fetus between the age of 42 days and approximately 260 days, but calf dead between 260 days and full term is defined a stillbirth (Ganguly, 2015). In dairy cows, abortions showed affected by parity and season. It found higher in party 1 (1.4%) than

(1.01%) party 8, however, abortions lowest in winter than summer season (Norman *et al*., 2012).

At best, a cow is only likely to produce a single calf per year. Pregnancy losses are important factors determining the reproductive performance of dairy herds. Conversely, average cost of a pregnancy loss was estimated at $555 but varied depending on days in milk at conception and stage of gestation when the pregnancy is lost (De Vries, 2006).

Silke *et al*., (2002) recorded that milk production effect on embryo loss and the rate between days 24 and 80, the embryo losses were 7% in lactating cows and 6% approximately in heifers with 48% of these losses occurred between days 28 and 42 of gestation. However, in intensively managed dairy cows yielding between 11,000 and 12,000 kg of milk per lactation 20% of embryos were lost between days 28 and 98 of gestation (Vasconcelos *et al*., 1997). Circulating progesterone concentrations decreases in high milk production of Holstein cows. During gestation, progesterone influences embryo development, stimulates interferon-tau production, and inhibits the luteolytic cascade (Shahneh *et al*., 2008). The occurrence of clinical mastitis after pregnancy examination has been associated with increased pregnancy loss. In one study, cows with clinical mastitis between artificial insemination (AI) and day 45 after AI were 2.8 times more likely to lose their pregnancy as compared to healthy cows (Chebel *et al*., 2004). In U.S. dairy herds, cows with reducedBCS either at calving or at the time of the first postpartum AI are at a greater risk of losing their pregnancies from day 30 to 58 of gestation (Santos *et al*., 2009). Therefore, the objectives of this study were to determine the effects of age, live body weight, parity, season of year, milk yield, nutrition and mastitis on the incidence of pregnancy loss of Friesian cows under the Egyptian condition.

MATERIALS AND METHODS

The data of 1486 records of Friesian cows raised at Sakha station, Animal Production Research Institute (APRI), Egypt, from 2007 to 2015 that were culled from the herd were used in this study. Data of each cow record include birth date, live body weight at conceived serviceparity, season of year, and milk yield. From these data, the following traits were statistically calculated:

1- Age at the conceived service was classified into different groups (≤ 16, 16.1 to 24, 24.1 to 50, 50.1 to 72, 72.1 to 96 and ≥96.1 months).
2- Live body weight was divided into four different groups (≤ 400, 401 to 499, 500 to 599 and ≥ 600kg).
3- Parities of each cow.

4- Daily milk yield (kg) and its frequency.
5- Reproductive season (spring, summer, autumn and winter).
6- Nutrition systems (two systems).
7- Somatic cell counts (SCC/) dose to the concerned date infection classified according to the rate of infection (≤ 200.000, 201.000 to 300.000, 301.000 to 400.000, 401.000 to 500.000, 501.000 to 600.000 and ≥ 600.000 SCC/ml milk).

Free mastitis = SCC ≤ 400.000 cells/ml milk, subclinical mastitis = SCC 400.000: 600.000 cells/ml milk andclinical mastitis ≥ 600.000 /cells/ml milk.

Management and feeding:

During the period from 2007 to 2015, all animals were farm fed in- group according to their body weight, milk production and reproductive status. Cows were fed on concentrate feed mixture (CFM), maize silage (MS) and rice straw (system 1) from June to the end of October. While, from November up to the end of April, animals were fed CFM, fresh berseem and rice straw (system 2). The concentrate feed mixture was offered twice daily at about 8.0 a.m. and 2.0 p.m. while rice straw and the drinking water were available for all cows along the daily time. All lactating Friesian cows were machine milked twice daily at 6 a.m. and 5 p.m. out the milking time, all cows were kept untied in semi-open and shaded yard. The examination of reproductive tract of all animals by rectal palpation revealed that the genitalia of all animals were free from any pathological diseases and disorders.

Statistical Analysis:

The obtained data were statistically analyzed using SAS (2004) to determine the factors associated with the incidence of pregnancy loss in Friesian cows raised under the Egyptian condition . The data were analyzed according to Snedecor and Cocharn (1989) and the statistical model was:

$Y_{ij} = U + A_i + e_{ij}$.

Where:

Y_{ij} = Observed values.

U = Overall mean.

A_i = Animals (normal pregnancy and loss).

e_{ij} = Random error.

Chi-square was used to test the differences between the normal pregnancy and pregnancy loss. Duncan Multiple Range test (Duncan, 1955) was used to get the mean separations between normal pregnancy and pregnancy loss.

RESULTS AND DISCUSSION

Based on the data recorded and statically analyzed, several factors appear related to pregnancy loss in Friesian cows raised under the Egyptian conditions.

Age at conceived insemination:

Age at insemination of conception shows a highly significant (P<0.05) effect of the pregnancy loss in Friesian cows ≤16 and ≥ 96.1 months of extremely low age (≤ 16 moth) and extremely old (≥ 96 moth) than the other cows at the different ages of pregnant (Table 1).

Table 1: Effect of different ages at insemination and its frequency on pregnancy loss in Friesian cows

Age at pregnant (month)	Total animal pregnant	Pregnancy normal		Pregnancy loss	
		No.	%	No.	%
≤ 16	34	25	73.53^{c}	9	26.47^{a}
16.1 ~ 24	157	141	89.81^{a}	16	10.19^{c}
24.1 ~ 50	477	434	90.99^{a}	43	9.01^{c}
50.1 ~ 72	391	363	92.84^{a}	28	7.16^{c}
72.1 ~ 96	237	217	91.56^{a}	20	8.44^{c}
≥ 96.1	190	159	83.68^{b}	31	16.32^{b}
Overall mean	**1486**	**1339**	**90.11**	**147**	**9.89**

a ,b, c Means denoted within the same column, with different superscripts are significantly different at P<0.05.

The age of cows at the final fertilized insemination (service of conception) in young age and old age cows were associated with increase embryo or fetal losses by 26.47 and 16.32%, respectively than the moderate age (7.16 to 9.03%,Table 1). The incidence of pregnancy loss in heifers inseminated at 16 to 24 months of age showed lower (10.19%) than that the older cows having more than 96 months of age (16.32 %). The results are in agreement with that reported by Thurmond *et al*. (1990a) who reported that the abortion rate increased after cows reached 5 year of age. Heifers are generally considered to have higher pregnancy rates, and this increase seems to be associated with less embryonic mortality than in cows (Geary, 2005). Among dairy cattle, an increase of both early and late embryonic losseswas reported in cows with the increase of age (Humbolt, 2001; Starbuck *et al*., 2004).

Live body weight:

The data presented in Table 2 demonstrate the relationship between cows live body weight and the incidence pregnancy loss. Pregnancy loss showed significantly higher (P<0.01) in cows with ≤400 and ≥600 kg live body weight (13.51 and 20.59%, respectively) compared to the other cows with401 ~ 499 and 500 ~ 599 kg by about 7.94 and 8.69%, respectively (Table 2).

Table 2: Effect of live body weight (kg) and its frequency on the incidence of pregnancy loss in Friesian cows raised in Egypt

Body weight (kg)	Total animal pregnant	Pregnancy normal		Pregnancy loss	
		No.	%	No.	%
≤ 400	37	32	86.49[b]	5	13.51[b]
401 ~ 499	554	510	92.06[a]	44	7.94[c]
500 ~ 599	725	662	91.31[a]	63	8.69[c]
≥ 600	170	135	79.41[c]	35	20.59[a]
Overall mean	1486	1339	90.11	147	9.89

[a, b, c] Means denoted within the same column, with different superscripts are significantly different at P<0.05.

Parity:

Data in Table 3 show that cows parity was significantly (P<0.01) affect the incidence of pregnancy loss or abortionin Friesian cows raised in Egypt. The incidence of pregnancy losses showed significantly higher (P<0.01) in cadence cows with 5 and ≥ 6 parities (14.42% and15.59%) compared with that of 1st, 2nd or 3rd parities (7.83, 8.83 and 8.41%, respectively). Some of cows that frequently aborted abortions during earlier lactations must culled (Peter, 2000). Santos *et al*. (2004a) reported that pregnancy loss was 10.7% for lactating cows and 4.2% for dairy heifers whereas, Thurmond *et al*. (1990b) reported that abortion rate was higher among cows that had experienced a previous abortion compared with those that had not. All causes of higher abortion frequencies for earlier parities are unknown, although parities differences in traits such as dystocia and stillbirth have been reported (Cole *et al*. 2007; Zaborski *et al*. 2009; Norman *et al*. 2010).It would be expected to have an effect on subsequent reproductive health. A contrasting result were reported by Thurmond *et al*. (1990b), who found that abortion rate increased after cows reached after 5 pregnancies, or after 4 calving.On theother hand, Norman *et al*. (2012) found that frequency of abortions was 1.40% for parity 1 and 1.01% for parity ≥8in dairy herd improvement-recorded.

Table 3: Incidence of pregnancy loss in Friesian cows raised under the Egyptian conditions in relation to parity

Parity	Total animal pregnant	Pregnancy normal		Pregnancy loss	
		No.	%	No.	%
1	447	412	92.17[a]	35	7.83[c]
2	351	320	91.17[ab]	31	8.83[bc]
3	226	207	91.59[a]	19	8.41[c]
4	172	154	89.53[b]	18	10.47[b]
5	104	89	85.58[c]	15	14.42[a]
≥6	186	157	84.41[c]	29	15.59[a]
Overall mean	**1486**	**1339**	**90.11**	**147**	**9.89**

[a ,b ,c] Means denoted within the same column, with different superscripts are significantly different at P<0.05.

Daily milk yield:

Data in Table (4) indicated that milk yield was significantly (P**<**0.05) associated with the incidence of pregnancy loss in high milk yield cows (equal or more than 20 kg daily milk yield) compared with moderate and low milk yielder (**≤**6 to 15 kg daily milk yield).

Table 4: Incidence pregnancy loss in Friesian cows raised in Egypt in relation to milk yield (k g)

Milk yield (kg)	Total animal pregnant	Pregnancy normal		Pregnancy loss	
		No.	%	No.	%
≤ 6	72	66	91.67[a]	6	8.33[c]
6.1 ~ 10	305	277	90.82[a]	28	9.18[c]
10.1 ~ 15	761	691	90.80[a]	70	9.20[c]
15.1 ~ 20	249	221	88.75[b]	28	11.25[b]
≥ 20	99	84	84.85[c]	15	15.15[a]
Overall mean	1486	1339	90.11	147	9.89

[a ,b ,c] Means denoted within the same column, with different superscripts are significantly different at P<0.05.

The present results are in agreement with that of Norman *et al*. (2012), who reported that cows in the high yield had higher abortion rates (1.39 to 1.53%) than cows in a low daily milk yield (0.76 to 0.98%). The historic trend for increased milk yield per cow (Animal Improvement Programs Laboratory, 2011b) may have contributed to increased abortions over time. One of the consequences of high milk production is an increased metabolic rate linked to a greater dry matter intake. This process reduces plasma concentrations of steroid hormones such as progesterone (Sangsritavong *et al*., 2002). In fact, milk production can affect negatively plasma progesterone concentrations at the onset of the fetal period (Bech-Sàbat *et al*., 2008; Rhinehart *et al*., 2009). Therefore, it seems reasonable to suppose that one of the causes of early fetal loss in high producing dairy cows could be due to the suboptimal concentrations of progesterone. Thus, strategies that induce the formation of an additional corpus luteum may help to increase progesterone levels in high producers cows, although treatment with GnRH at AI (López-Gatius *et al*., 2006) and with GnRH or hCG at pregnancy diagnosis (Bartolomé *et al*., 2006; Stevenson *et al*., 2008) clearly increase the number of additional corpora lutea, those treatment did not reduce fetal loss in any**.**

Seasons:

Data presented in Table (5) showed that in summer season pregnancy loss in Friesian cows was significantly (P<0.01) higher (12.25%) than other seasons (6.89,8.85 and 9.27% in winter, spring and autumn seasons, respectively). In addition, pregnancy loss showed significantly correlated with the month, in which a successful insemination was performed. It was found that pregnancy loss up to 90 day of its development occurred most frequently after inseminations performed in April (P=0.027), and most seldom after cows insemination in August (Gehrke and Zbylut, 2011).

Table 5: Incidence of pregnancy loss in Friesian cowsraised under the Egyptian conditions in relation to season

Season	Total animal pregnant	Pregnancy normal		Pregnancy loss	
		No.	%	No.	%
Spring	399	362	90.73[a]	37	9.27[b]
Summer	341	289	84.75[b]	52	15.25[a]
Autumn	339	309	91.15[a]	30	8.85[b]
Winter	407	379	93.11[a]	28	6.89[b]
Overall mean	**1486**	**1339**	**90.11**	**147**	**9.89**

[a ,b ,c] Means denoted within the same column, with different superscripts are significantly different at P<0.05.

The present results are in agreement with that of Al-Samarai *et al*. (2012) who found that the highest pregnancy loss ratio in summer and spring, whereas the lowest was in winter and autumn. The significant differences between estimates may belonged to high temperature degrees which could caused heat stress and abortion in animals. Hovingh (2009) reported that heat stress can affect reproductive performance in dairy herd, causing a conception problems rather than abortions. While, there is some evidence to suggest that a very sudden increase in environmental temperature may result in abortion. There was little evidence to support heat stress as a common cause of pregnancy loss or abortion. Jordan (2003) reported that negative effects of heat stress have been identified from 42 day before to 40 day after insemination which was representing synchronization between heat stress and each of early and late pregnancy loss.

In dairy cattle, short term heat stress at the time of breeding or within the 1st week after breeding appears to be the most deleterious time for due to elevated temperatures, asa results of in delayed embryonic development that eventually becomes “out of sync” with its maternal environment. The previous results may explained by the finding of Biggers *et al*. (1987) and Geisert *et al*. (1988) who reported that the cowsexposed to heat stress from day 8 to 16 after breeding had decreased progesterone concentration and increased uterine prostaglandin secretion.

Nutrition:

Data presented in Table 5 showed that nutrition in Friesian cows were significantly (P<0.01) associated withthe incidence pregnancy loss in system 1 than in system 2.Nutrition in system 1 was containing fresh berseem higher in energy and protein levels, minerals and vitamins compared in nutrition 2 containing maize silage lower in protein levels. The results are in agreement with that of Wiltbank *et al*. (1962), who found that the effect of nutrition on embryonic mortality and failure of fertilization are correlated with the embryonic mortality. However, it was known that energy and protein levels play a role in maintaining pregnancy, therefore, it is essential for cows to be in adequate condition in order to minimize embryonic loss. When producers can manage body condition by scoring the cows body condition several months before breeding and adjusting diets according to specific needs. Cows will have less embryonic mortality if they are gaining suitable condition, whereas, those losing condition will tend to have higher embryonic loss (Wiltbank *et al*., 1962).

It has been documented that an excess of protein will increase embryo mortality (Blanchard *et al*., 1990; Elrod *et al*., 1993). Excess levels of dietary protein could possibly alter hormone secretion, such as progesterone, in the uterus or could increase blood urea concentrations. These changes could be toxic to the developing embryo. Dairy cattle fed high protein diets are usually exposed to this problem (Kaim *et al*., 1983).

Table 6: Incidence of pregnancy loss in Friesian cows raised in Egypt in relation to nutrition system

Items	Total animal pregnant	Pregnancy normal		Pregnancy loss	
		No.	%	No.	%
System 1	740	651	87.97[b]	89	12.03[a]
System 2	746	688	92.33[a]	58	7.77[b]
Overall mean	**1486**	**1339**	**90.11**	**147**	**9.89**

[a and b]:Means denoted within the same column, with different superscripts are significantly different at P<0.05. System 1=concentrate feed mixture (CFM), maize silage (MS) and rice straw. System 2=concentrate feed mixture(CFM), fresh berseem and rice straw.

Somatic cell counts (SCC) or mastitis:

The data presented in Table 7 showed that the SCC or mastitis infectionat insemination time in pregnancy losscows were significantly (P<0.01)more than 400000 SCC/ml (subclinical mastitis) and highly significantly (P<0.001)in cowsassociated with 600.000 cell per ml(clinical mastitis) .

Mastitis infection can be caused by either gram-negative or gram-positive organisms. The former releases endotoxins from its lipopolysaccharides-containing cell wall that can induce endogenous release of PGF2α. In addition, similar to gram-negative, grampositive bacteria can cause inflammatory responses, pyrexia, and septic shock. It is known that mastitis, either clinical or subclinical, is associated with reduced conception rates in dairy cattle (Schrick *et al*., 2001). Several epidemiological studies have indicated a strong relationship between mastitis and risk of pregnancy loss in lactating dairy cows. Risco *et al*. (1999) evaluated the risk of fetal loss in 2087 cows diagnosed pregnant, They concluded that cows diagnosed with clinical mastitis during the first 45 d of gestation were at 2, 7 (95% confidence interval = 1,3 to 5,6) times greater risk of abortion within the next 90 day of gestation than herdmates without mastitis.

Table 7: Pregnancy lossesin Friesian cows in relation to somatic cell counts (SCC)

SCC ×106	Total animal pregnant	Pregnancy normal		Pregnancy loss	
		No.	%	No.	%
≤ 200	336	321	95.54[a]	15	4.46[e]
201 ~ 300	315	297	94.29[ab]	18	5.71[de]
301 ~ 400	236	217	91.95[b]	19	8.05[d]
401 ~ 500	216	190	87.96[c]	26	12.04[c]
501 ~ 600	224	188	83.93[d]	36	16.07[b]
≥ 600	159	126	79.25[e]	33	20.75[a]
Overall mean	**1486**	**1339**	**90.11**	**147**	**9.89**

[a, b & c] Means denoted within the same column, with different superscripts are significantly different at P<0.05.

The present results are in agreement with that of Santos *et al*. (2004b) who found that animals withdeveloping mastitis prior to artificial insemination (AI) fromAI to pregnancydiagnosis, and after pregnancydiagnosis had greater incidence ofpregnancy loss and abortion than that not developing mastitisthroughout lactation period. Similarly, Chebel *et al*. (2004) observed that the incidence of clinical mastitis between pregnancy diagnosis and reconfirmation was associated with increase of late embryonic loss (P= 0,02). Cows experiencing clinical mastitis were 2,80 (95% confidence intervaltimes more likely to lose their pregnancy than those not experiencing mastitis. In pasture-based systems, clinical mastitis was also associated with risk for pregnancy loss (McDougall *et al*., 2005). Therefore, it is clear that clinical mastitis found associated with the increasing risk for pregnancy loss, although it is less clear whether this is a direct causal relationship or that the underlying mechanisms leading to mastitis that also influence the maintenance of pregnancy in cattle. Day of AI to pregnancy reconfirmation was associated with the increase of pregnancy loss. McDougall *et al*. (2005) found that the highest rate of pregnancy loss occurred in early gestation. Clinical mastitis, anoestrus and calving late in the calving season were risk factors for pregnancy loss.

Age of fetal loss and its frequency:

Data in Table (8) show that intrauterine age of fetal lost and its frequency were significantly (P<0.05) higher in late trimester (39.46%) than in early and mid cows (14.97 and 10.88%, respectively) of total cows pregnancy loss (147 cows pregnancies).

Table 8: Intrauterine life age of Friesian cows pregnancy loss along the pregnancy period

Age of fetal loss (days)	Pregnancy loss		
	N	% of pregnancy loss	% of total animals*
42 ~ 156[(1)]	16	10.88^b	1.08^b
157 ~ 200[(2)]	22	14.97^b	1.48^b
201 ~ 259[(3)]	58	39.46^a	3.90^a
≥ 260[(4)]	51	34.69^a	3.43^a
Total	**147**	**100**	**9.89**

[a and b]:Means denoted within the same column, with different superscripts are significantly different at P<0.05. (1) early pregnancy loss, (2) mid pregnancy loss, (3) late pregnancy loss, (4) still birth and * number of total animals pregnant is 1486 cows.

The results are in agreement with that of Hovingh (2009) who, reported that fetal loss occurs in high gestation than early, also, Kirk (2003) and Forar (1996) reported that 10.8% fetal loss between 31 and 260 days of gestation in Holstein cows.

In this study the overall mean incidence of pregnancy loss was 9.89% (Jousan *et al*., 2005) found that the incidence of pregnancy loss in dairy cows in ranges between 0.4% and 10.6% and usually is higher in cows than in heifers and is more frequently during the first trimester of pregnancy.

CONCLUSION

The current study concluded that the incidence of pregnancy losses in Friesian cows increased in cows aged ≤16 and ≤96.1 months, weighted ≤400 and ≥600 kg live body weight, parities more than 4, summer season, high milk yield (equal or more than 20 kg daily milk daily) and having aclinical mastitis or SCC more than 400000 SCC/ml and more than 600000 cell/mlin Egypt. As a results, pregnancy losses in Friesian cows in this study were affected by season, parity, milk yield and mastitis.

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العوامل المرتبطة بفقد الحمل في الأبقار الفريزيان تحت الظروف المصرية

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تهدف هذه الدراسة إلي تحديد العوامل التي تؤثر على فقد الحمل أو الإجهاض تحت الظروف المصرية. واستخدم فيها 1486 سجل لأبقار الفريزيان الحلابة من سنة 2007-2015 . وكانت النسبة العامة من فقدان الحمل هذه الدراسة هي 9.89٪ تحت الظروف المصرية.

- وأظهرت النتائج أن العمر عند التلقيح في الأبقار الفريزيان الأصغر من 16والأكبر من 96،1 شهرا من العمر على التوالي كان مرتبط معنويا حيث ارتفع حدوث فقدان الحمل مقارنا بالأبقار من عمر 16،1و حتى عمر 96 شهرا .
- وأيضا كان لوزن الجسم صلة في حدوث فقدان الحمل حيث كان عالي المعنوية في الأبقار ذات الوزن أقل من400 كيلو جرام وأكثر من 600 كيلو جرام وزن الجسم حي (13،51و20،59٪) بزيادة قدرها 7،94و8،69٪ عن الأبقار ذات الوزن 401~499 و500~599 كيلو جرام عند التلقيح على التوالي.
- اظهر موسم الولادة في الأبقار تأثير معنوي في حدوث فقدان الحمل حيث ارتفع الفقد في المواسم الرابع والخامس و السادس وما فوقه مقارنا بالمواسم الموسم الأول والثاني والثالث.
- وكذلك كان لفصل السنة تأثير معنوي حيث زاد فقد الحمل في فصل الصيف مقارنا بباقي فصول السنة. بالإضافة إلى أن فقد الحمل كان عالي المعنوية في الأبقار عالية الإدرار (≤20 كيلو جرام في اليوم) مقارنا الأبقار المنخفضة أو المتوسطة.
- كان لنظام التغذية تأثير معنوي لحدوث فقد الحمل، وكذلك أدي زيادة العدد الكلى لعدد الخلايا الجسدية أو حدوث التهاب الضرع عند التلقيح لأبقار الفريزيان إلي زيادة عالية المعنوية لحدوث فقد الحمل.