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Effect of Heat and Cold Stress on Incidence of Retained Placenta in Cows in Thi-Qar Province

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Abstract
The present study appeared effect winter season on increase retained placenta cases comparative with other seasons that recorded about 38.89 in winter while recorded about 5.56% in summer, also this study recoded the effect of the geographical area to spread retained placenta, the north of thi- qar recorded 63.89% higher than other area west and south recorded about 5.56% and 11.11% respectively, the present study showed the effect of temperature degree to spread retained placenta cases . The low temperature degree between (11 to 20) appeared significant increase of retained placenta cases (52.78%) comparative with high temperature (40 to 50) degree about 2.68%. this study conclude increase of retained placenta cases in north region of Thi-Qar province in winter comparative with south region in summer.
Key words: Stress, Temperture, Retained placenta

الملخص
اظهرت الدراسة الحالية تأثير فصل الشتاء على زيادة حالات احتباس المشيمة مقارنة مع بالفصول الاخرى حيث بلغت 38.89% في فصل الشتاء بينما بلغت 5,56% في فصل الصيف. كما سجلت الدراسة الحالية تأثير الرقعة الجغرافية على انتشار حالات احتباس المشيمة حيث وجد ان عدد الحالات المسجلة في شمال ذي قار 63.89 % وكانت اعلى من المناطق في غرب وجنوب ذي قار التي سجلت نسبة 5.56% و11.11 % على التوالي. وشملت الدراسة الحالية تأثير درجات الحرارة على معدل انتشار الحالات حيث اظهرت ان معدل درجة الحرارة من 11 الى 20 هو الاعلى اصابة بين المعدلات الاخرى والتي بلغت 52.78 % بينما قلت الاصابة عند معدل درجة حرارة بين 41 الى 50 حيث بلغت النسبة 2.68%. استنتجت الدراسة الحالية زيادة عدد حالات الاصابة في المناطق الشمالية ذات درجات الحرارة المنخفضة في فصل الشتاء مقارنة مع عدد الحالات التي سجلت عند درجات الحرارة المرتفعة في فصل الصيف.

الكلمات المفتاحية: الاجهاد، درجات الحرارة، احتباس المشيمة

Introduction

Placenta is a temporary endocrine gland where part of it develops from maternal uterine tissues while the other part develops from blastocyst which forms the fetus. In normal condition, placenta is expelled within 12-hours after delivery[1], but other study is define of retained fetal membranes is varied, ranging from retention of the placenta for 8 to 48 hours postpartum. [2, 3] Most studies define RFM in cattle at 12 to 24 hours.[4, 5] The main role of placenta is focused on nutrient and oxygen transfer from dam to the embryo, in addition it secretes many hormones to support pregnancy and fetal growth.[6]

Retained placenta is a pathological reproductive condition results from failure of the expulsion of all or part of the placenta or fetal membranes after delivery through 12 days (1). The fundamental causes of RP fluctuated from twine birth, nutritional deficiency, low immunity and environmental and hormonal causes.[7] Fetal membranes retention is a common complication of bovine parturition. RP produces several harmful effects inside reproductive organs of female because it allows growth of microorganisms inside the uterus causing uterine inflammation.[8] Other risk factors associated with RP include delay uterine involution, ovarian cystic degeneration, chronic endometritis, pyometra and infertility.[9, 10] Main economic impacts of retained placenta are: decreased milk production (40%), increased veterinary services (32%), increased culling rate (19%) and increased calving interval (9%).[11]

Climatic researches have particular importance in countries such as New Zealand and Australia, where cows are kept outdoors year-round, and can be exposed to extreme weather conditions which can impact the production and welfare of the animals.[12] large focus on the effect of climatic stress on the productive and reproductive performance of dairy cows especially in tropical and sub-tropical environments.[13] Research about the effect of cold conditions on reproductive performance has had very little attention.[14] Although there is evidence that cold conditions affect the reproductive function of dairy cows.[15] Heat stress can increase corticosteroid secretion[16], reduce plasma estradiol concentrations.[17] Heat stress reduces the degree of dominance of the selected follicle and this can be seen as reduced steroidogenic capacity of its theca and granulose cells and a fall in blood estradiol concentration.[17, 18, 19] The mechanisms by which heat stress alters the concentrations of circulating reproductive hormones are not known. Increased corticosteroid secretion has been suggested[20] because

this can inhibit GnRH and thus LH secretion.[21] In a detailed study, heat stress inhibited the secretion of gonadotropins to a greater degree in cows with low plasma concentrations of estradiol compared to those with high concentrations.[17]

Heat stress can act directly on the ovary to decrease its sensitivity to gonadotropin stimulation.[13] Heat stress can affect endometrial prostaglandin secretion, leading to premature luteolysis and fetus loss[18], therefore all these causes leading to retention of placenta occurrence. The study aimed to collect information about cases of placenta retention in Thi-Qar province and to know the impact of the environment on the spread of these cases and evaluation of cold and heat stress effect on the incidence of fetal membranes retention in local crossbreed cow.

Maternal and method

Thirty six cases of placenta retention recorded in veterinary hospitals throughout Thi-Qar province were collected for two years from 2021 to 2022, after that data collect about maximum and minimum temperature during and through the days in which placenta retention occurred, these data collect from meteorological authority in Thi-Qar province.

Statically analysis

The Statistical Analysis System- SAS (2018) program (22) was used to detect the effects of difference factors in study parameters. Chi-square test was used to significant compare between percentage (0.05 and 0.01 probability) in this study.

Results and discussion

Stress has been demonstrated to impact virtually every organ in the body, even the fetus. In this study, we provide evidence that stress exerts a significant effect on the placenta. Cold stress include prenatal cold stress is one of these stressors, which is a major factor that can negatively affect the growth and production of all livestock species in north frigid area.[23] The present study appeared highest incidence of retained placenta was recorded about (38.89%) in winter compared with summer which recorded about (5.65%). This result disagreement with[24] which appeared highest incidence of retained placenta in summer was recorded 18.3 % compared with winter about (7.58%), this difference can explain due to of adaptation of cows in those areas to the hot weather in southern Iraq. The current study appeared highest incidence of retained placenta was recorded in north about (63.89) compared with west and south about (5.56%, and 11.11%), this increasing in north because of low temperature degree is more than in south of Thi-Qar province also due to the lack of adaptation of cows in those areas to the cold weather in southern Iraq

Also, the present study showed highest incidence of retained placenta was recorded about (52.78%) in low temperature degree between (11- 20 C) compared with high temperature degree between (40-50C) about (2.78%), this result disagreements with (24 and 25) which reported that summer temperature increase rate of retained placenta. The present study appeared decrease in retained placenta cases in the days when the temperature is high due to the adaptation of cows in those areas to the hot weather in southern Iraq. It is concluded that cold stress increase the incidence of retained placenta more than heat stress. Therefore, ameliorative steps may be taken during winter.

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Table 1: Show distribution of retained placenta to different season.

Direction	No of Retained placenta cases	Percentage
North	23	63.89
South	4	11.11
East	7	19.44
West	2	5.56
Chi-Square -χ^2 (P-value)	---	30.44 **(0.0001)
** (P≤0.01).		

Table 2: Show the distribution of retained placenta cases according to geographical area Thi-Qar province.

Direction	No of Retained placenta cases	Percentage
North	23	63.89
South	4	11.11
East	7	19.44
West	2	5.56
Chi-Square -χ^2 (P-value)	---	30.44 **(0.0001)
** (P≤0.01).		

Table 3: Show distribution of retained placenta cases according to minimum and maximum temperature degree range.

Temperature degree	No. of Retained placenta cases	Percentage
11 - 20	19	52.78
21 - 30	13	36.11
31 - 40	3	8.33
41- 50	1	2.78
Chi-Square -χ^2 (P-value)	---	24.001 (0.0001)
** (P≤0.01).		