

Original Research Article

Concentrations of Some Biochemical Parameters and Body Condition Scores in Cows with Retained Placenta and Dystocia

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Abstract: This study was undertaken to investigate the relationship between body condition score and blood levels of Ca, Mg, P, Glucose, Urea and Triglyceride and occurrence of retained placenta and dystocia in cows. Serum samples from 46 cows were analyzed (26 with retained placenta, 22 with dystocia). Our results show that cows have a percentage of occurrence of dystocia and retained placenta at a rate of 68.18%, 57.69% respectively and that the lean and fat cows have a rate of dystocia almost identical of 40.90% , 36.36% respectively, these cows present a hypocalcemia with a rate of (38.89, 38.89)%, hypophosphatemia with a rate of (38.46, 30.76)%, hyperglycemia with a rate of (46.66, 33.33)% and hypertriglyceridemia with a rate of (60, 26.66)%. We also noted that placental retention rate is of 61.53% touching the fat cows and that these cows have significant metabolic disturbances: hypocalcemia, hypophosphatemia with a rate of 83.33%, hypomagnesemia with a rate of 82.35%, hypoglycemia of the order of 84.21% and a hyperuremia with a rate of 80% (P < 0.001). It was also noted that the lean cows affected with retained placenta show an uremia were significantly lower than the fat cows with a rate of 71.42%. It is concluded that lower serum (Ca, P) and higher serum (glucose and triglyceride) for fat cows or lean cows may induce the dystocia and lower serum (Ca, P, Mg, glucose) and higher serum urea in fat cows and lower serum urea in lean cows may induce placenta retention.

Keywords: Retained placenta, Dystocia, mineral substance, dairy cow, BCS.

INTRODUCTION

Mastering reproduction of dairy farming requires knowledge of its nutritional needs and are hygienic status because they have an important influence on the calving-calving interval and calving first artificial insemination. Body condition score is an arbitrary scale for estimating the quantity of fat reserves in specific anatomical regions. High producing dairy cows must calve with adequate stored fat to be mobilized to meet the energy requirements of peak milk production during early lactation [4]. In early lactation, dietary intake is unable to meet the demands of high milk production. The cow therefore enters a period of negative energy balance (NEB), which leads to mobilization of body reserves to balance the deficit between food energy intake and milk energy production [2]. The process of mobilization seems to affect the well being of the cow, and other biological pathways are compromised as intake energy is directed toward production [5]. Knight CH *et al.*[14] used the terms metabolic load and metabolic stress to describe effects of high production on dairy cattle. According to [14], metabolic load can be defined as “the burden imposed by the synthesis and secretion of milk” and metabolic stress can be defined as “that amount of metabolic load which cannot be sustained, such that some energetic processes, including those that maintain general health,

must be down regulated.” Some health and reproductive problems may be a result of the increased stress that high producing cows are under in early lactation [8-15].

This paper presents preliminary analyses of some biochemical parameters in fat and lean cows with dystocia and retained placenta in high producing Holstein dairy cows in Chlef.

MATERIALS AND METHODS

This study was conducted during July, 2011 to June, 2013, Data used for consisted of information on single lactations from 46 Holstein cows, belonging to two farms located in a department of western Algeria, wilaya Chlef. All the cows have an age between 3 and 10 years. The assessment of energy balance was based on five body condition scores. The scoring criteria used are those developed by [7]. Blood samples were collected via jugular venipuncture, in order to compare some biochemical parameters in 26 cows presenting retained placenta and 22 cows presenting dystocia these samples are placed in heparin tubes. For all measurements, plasma was prepared by centrifugation (20 min, 3,000 × g at 4°C) of blood and stored at -20°C until analysis. Plasma concentration of (glucose, triglyceridemia, urea, calcium, phosphorus, magnesemia) was measured using colorimetric kits

from Biomaghreb (Tunis). The assays were carried out by using a multi-analyzer spectrophotometer (ERMA, Japan). All statistical analyses were performed with the "XL stat" program, by applying the Z test (comparison of two percentage).

RESULTS AND DISCUSSION

Results of the present study is showing that the fat cows and the lean cows presenting dystocia exhibit hypocalcemia, hypophosphatemia, hyperglycemia and hypertriglyceridemia to important values at a rate of (38.89, 38.89)%, (30.76, 38.46)%, (33.33, 46.66)%, (26.66, 60)% respectively with a non-significant difference between the two cow categories (table1). The results of some biochemical parameters (serum calcium, serum magnesium, serum phosphorus, glucose, blood urea) obtained from cows with retained placenta are

summarized in Table 2 showing that the fat cows exhibit hypocalcemia, hypophosphatemia, hypomagnesemia, hypoglycemia and hyperuremia at the very high values due to (83.33%, 83.33%, 82.35%, 84.21%, 80%) when compared with the lean cows (16.66%, 16.66%, 17.64%, 15.78%, 28.57%) respectively $p \leq 0.001$ and $p \leq 0.05$.

Calving is certainly the event which includes the highest potential stress level for the mother. This event is linked to physiological changes[6]. The ACTH levels dramatically increase in fetal plasma, resulting in the release of glucocorticoids that induce mobilization of energy reserves and increasing blood glucose, the glucocorticoids have similar properties that calcitonin (effect antihypercalcemiante) [11].

Table 1 :Comparison of some biochemical parameters in cows presenting dystocia according body condition score.

BCS	(<2.5)	(2.5-3.5)	(>3.5)	Σ
Hypocalcemia (n)	7	4	7	18
Percentage%	38.89 NS	22.22	38.89 NS	100%
Hypophosphoremia (n)	5	4	4	13
Percentage%	38.46 NS	30.76	30.76 NS	100%
Hyperglycemia (n)	7	3	5	15
Percentage%	46.66 NS	20	33.33 NS	100%
hypertriglyceridemia(n)	9	2	4	15
Percentage%	60 NS	13.33	26.66 NS	100%

NS = not significant= difference between lean and fat insignificant n= number

Table 2 :Comparison of some biochemical parameters in cows presenting retained placenta according body condition score.

BCS	(<2.5)	(>3.5)	Σ
Hypocalcemia (n)	3	15	18
Percentage%	16.66	83.33**	100%
hypo magnesemia (n)	3	14	17
Percentage%	17.64	82.35**	100%
Hypophosphoremia (n)	3	15	18
Percentage%	16.66	83.33**	100%
Hypoglycemia (n)	3	16	19
Percentage%	15.78	84.21**	100%
hypo uremia (n)	5	2	7
Percentage%	71.42*	28.57	100%
Hyper uremia (n)	1	4	5
Percentage%	20	80*	100%

*, $P < 0.05$; **, $P < 0.01$; n= number

In addition, following calving, the milk production increases rapidly, so the needs too. But as the ingestion capacity is not increasing fast enough that the needs, the energy balance is negative until peak lactation. The cow thus draws on its reserves to ensure its production. [13]; [10] So these two phenomena (stress and energy deficiency) are involved in lipolysis (breakdown of triglycerides) to induce the formation of glucose, because it releases fatty acids and glycerol, this last is a precursor of glucose synthesis in the process of gluconeogenesis liver [16]. For this, most of the

available glucose in ruminants is synthesized in 93% through the phenomenon of gluconeogenesis, which is 85% hepatic and 8% renal [9]. This explains hyperglycemia, hypertriglyceridemia hypocalcemia and hypophosphatemia found in our results during the day of calving in fat and lean cows presenting the dystocia. Civelek T *et al.* [6] found that ACTH levels dramatically increase recorded similar result the overall, plasma glucose, HDL, triglycerides, and creatinine levels were all markedly increased in dystocia heifers and[23] announced that The most significant predictor

of dystocia is body condition score (BCS). The contractions that follow the calving lead to the expulsion of the placenta in 6-12 hours. If they are not expelled within 12 hours after calving, it is called Retained placenta (RP) [22]. This affection, in the past, often had an infectious origin (Bang's disease). Today, this disease is usually the result of error in feeding during the dry phase. [16],[1], [17] and [19] announced that the fat cow presented health problems following the action of hypocalcemia and hypomagnesemia. Effectively 65.38% of cows with retained placenta have showed a hypomagnesemia among them (82.35%) have a body condition score highest than 3.5. ($p < 0.05$) this is explained by the fact that hypomagnesemia reduced receptivity of myometrium to oxytocin, facilitates the occurrence of dystocia due to his role in muscle contractility, and consequently in retained placenta. Also insufficient intake of magnesium reduces bone response to parathormone (PTH) which increases the risk of hypocalcemia, given that PTH is hypercalcemic. [24]; [18]; [12] so magnesium deficiency seems to worsen the calcium deficiency, effectively 69.23% of fat cows presenting retained placenta have hypocalcaemia and hypophosphatemia ($p < 0.05$) and as the calcium is involved in the activation of the contractile system of the uterine muscle, its deficiency leads to a lack of tone of the uterus [1]. The majority of fat cows with retained placenta showed a hyper uremia with an appearance rate (80%) ($p < 0.05$) the latter is the result of gluconeogenesis from amino acid glucoformateur [10]. [18]And [19], found that excess nitrogen fermentable are most harmful by inducing inflammation Fetomaternal junction zones, which can increase the risk of retained placenta. In addition, excess fermentable nitrogen leads to a dysmicrobism ruminal producer amines vasoactive that predispose to inflammation [21]. Lower prepartal BCS could be an early predictor for RP risk [20], Our results show that 26.92% of cow presenting retained placenta exhibit hypouremiaamong these 71.42% have a body condition score below 2.5. Indeed [3] found that the nitrogen deficits in late pregnancy, as well as protein restriction during the dry period are reported as risk factors of non-delivery.

CONCLUSION

Retained placenta and dystocia can be reduced by prevention against hypocalcaemia, hypophosphatemia and maintain also adequate magnesium status of the dairy cow. Furthermore the Good body condition score at calving may play an important role to ensuring sufficient energy to the cow to avoid metabolic stress and to reduce disease.

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