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OVARIAN RESPONSE IN BRAHMAN COWS IN POSTPARTUM ANESTRUS FED WITH ENSILED OF SORGHUM

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ABSTRACT

Objective: To evaluate the restarting of ovarian cyclicity and the pre-ovulatory follicle diameter of cows in early postpartum period fed sorghum ensiled with sowing without fertilization (T1) and fertilized (T2).

Design / Methodology / Approach: Completely randomized design. The response variables were, presence of corpus luteum (CL), as indicative of restarting ovarian activity, and subsequent development of a follicle pre -ovulatory for both revisions ultrasound scanning was used. The data obtained was analyzed with PROC GLM of SAS (SAS, 2011) the measures were compared with the Tukey test (α= 0.05).

Results: In the 23 cows fed sorghum ensiled with fertilized sowing(T2) CL and pre - ovulatory follicle were observed. In the case of T1, only 12 cows developed corpus luteum and pre-ovulatory follicle. The diameter measure of the follicles of the cows in (T2) was 18.1mm, while T1 was 0.78mm.

Study limitations/implications: With the results observed in the present study, it can be inferred that the management of the crop, in this case the crop of sorghum, has effects on the ovarian reactivation of Brahman cows in the early postpartum period, which implies that the producer you must take care of the feeding of the cattle, from the moment of sowing until it reaches the mouth of animal.

Findings/conclusions: According to the results, it is concluded that feeding with ensiled of fertilized sorghum during sowing to cows in the early postpartum period could favor the restart of the estrous cycle and increase the diameter of the follicles.

Keywords: ovaries, corpus luteum, prostaglandins F2a, pre-ovulatory follicle, ultrasound scanning.

1. INTRODUCTION

Reproduction is a fundamental pillar of the livestock production system, depending, to a large degree, the productivity and rentability of bovine husbandry companies of the physiological

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capacity of females to meet the goal of having one calf per year (Meléndez and Bartolomé, 2017).
One of the problems faced by beef cattle producers is the postpartum anestrus, period after delivery during which there is not estrous(Báez and Grajales, 2009).A determining factor to reduce to the maximum the period of postpartum anestrus is a proper nutritional management (Motta-Delgado *et al.*, 2011).

In the tropics, the most used production system is the extensive, (Pérez *et al.*, 2001; Henao and González, 2008; Vásquez - Cano and Olivera-A, 2010; Franco andUribe, 2012), characterized in the reproductive field by low fertility of the cow due to poor nutritional level, especially in the dry season when paddocks decrease forage production (Osorio-Arce and Segura-Correa, 2010).An alternative in dry periods, is feeding with ensiled,since it is possible to offer quality food to animals. (Salcedo, 2007; Bolaños *et al.*, 2012; Fernández-Paredes *et al.*, 2017). In this respect the ensiled of sorghum is presented as an alternative due to the adaptation of the plant to tropical conditions(Ribeiro *et al.*, 2007; Carrasco *et al.*, 2011; Fernández *et al.*, 2013).
The application of feeding strategies can contribute to the activation of ovarian follicular dynamics,as revealed by transrectalultrasonography observations, showing that nutritional factors, management and season are related to the dynamics of follicular growth and the restart of the estrous cycle (Dominguez *et al.*, 2007; Gutiérrez-Lizarazo and Báez-Sandoval, 2014), being growth follicular an important aspect, due the size of it could be related with the percentage of gestation (Gonzalez, 2017), being more likely that with a larger diameter follicle increase the probability that a gestation will be established, than when there is a smaller follicle (Guzmán, 2018) .

Exist little investigation about the effect that the consumption of ensiled could have,from fertilized sowing on the ovarian dynamics of cows in early postpartum, so that the objective of this investigation is to evaluate the restart of ovarian cyclicity
and the diameter of the pre-ovulatory follicle of cows in early postpartum period fed with ensiled of sorghum with and without fertilization.

2. MATERIALS AND METHODS

Location

The field investigation was carried out from March 1st to May 30th, 2019 at Rancho los Laureles located at the coordinates Latitude: 16.4666, Longitude: -98.4166 16° 27′ 60″ North, 98° 24′ 60″ West, The area has an Aw climate characterized by being a dry tropic according to the Köppen-Geiger system classification. Climate data was obtained from the CONAGUA agro-meteorological station located in the municipality of Cuajinicuilapa.

The bromatological analysis of the ensiled of sorghum was carried out in the Animal Nutrition Laboratory of the Facultad de Medicina Veterinaria y Zootecnia N° 2 of the Universidad Autónoma de Guerrero.

Characteristics of the ensiled of sorghum

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Two ensiled of sorghum were used; T1 that was made with plants from a crop that was applied with 18-46-00 diammonium phosphate fertilizer, ammonium sulfate and urea, and T2 that was made with plants that came from a crop that did not receive any type of fertilization. Both ensiled were left to ferment for three months. Later, bromatological analyzes were performed, in the Animal Nutrition laboratory, determining dry matter (DM) and crude protein (CP),according to the methodology of AOAC (2005); neutral detergent fiber (NDF), acid detergent fiber (ADF) with the methodology described by Van Soest *et al.* (1991), and determination of lactic acid and pH with the methodology described by Lorenzo-Hernández *et al.*, (2019).

Table 1 shows the nutritional quality of the ensiled of sorghum with fertilization (T1) and without fertilization (T2) at sowing.

Table 1. Bromato logical analysis of the ensiled of sorghum with fertilization (T1) and without fertilization (T2) at sowing.

Element	T1 (%)	T2 (%)
Dry Matter (DM)	33.60	47.67
Crude Protein (CP)	7.83	5.83
NeutralDetergent Fiber	51.06	43.36
Acid Detergent Fiber	28.51	25.21
Lactic Acid	4.51	2.86
pH	4.33	4.66

Selection and management of cattle

46 multiparous Brahman breed cows were selected between 6 and 8 years of age, with 90 days postpartum, which were weaned at the start of the investigation, moment in which the evaluation of the reproductive system was carried out using a Chison *Eco*5®ultrasound scanner (China)with a 6.5 MHz linear rectal transducer, verifying absence of CL.

The cows were divided randomly into two groups of 23 cows, one group was fed with ensiled of sorghum with fertilized sowing (T1), the other group was fed with ensiled of sorghum without fertilized sowing (T2).

The daily consumption of ensiled, kg DM/cow/day, which was adjusted to 3% of live weight (PV) Cerdas-Ramírez (2013). During the experiment, the cows were weighed monthly to perform the consumption adjustment and keep the proportionbefore mentioned (Table 2).

The cows were subjected to a period of adaptation to silage consumption for 10 days. During the period study, the cows were kept stabled with water *ad libitum*, offering the ensiled at 7:00 and 16:00 h.

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Table 2. Monthly average in kg of dry matter (DM) of the ensiled of sorghum offered/animal/day to cows in early postpartum period.

Ensiled	March	April	May
T1 (kg DM)	11.58^{-1}	12.21^{-1}	12.84^{-1}
T2 (kg DM)	11.4^{-1}	11.94^{-1}	12.48^{-1}

T1:ensiled made with fertilized sorghum during sowing, T2: ensiled made with unfertilized sorghum during sowing.

Body condition (CC).

The initial body condition (CC) was evaluated at the beginning and at the end of the study period, using the methodology described by Wildman *et al.*, (1982) with a scale of 1 to 5 points, with increments of 0.25 points, where 1 is a starving cow and 5 is obese. At the beginning of the experiment, the cows in both groups exhibited a CC of 1 ± 0.5 points.

Ovarian response

On day 75 of treatment, ultrasound scanning examination was performed to verify the ovarian condition, presence of corpus luteum.

To homogenize the observation time of the pre-ovulatory follicle, cows with presence of corpus luteum were applied 5ml of prostaglandins $F_{2\alpha}$ ($PGF_{2\alpha}$) (Lutalyse/Zoetis®) (D'Enjoy *et al.*, 2012), whose first dose was applied on day 75 of treatment and the second dose was applied on day 87. Subsequently, on day 90 the presence of the pre-ovulatory follicle was determined,considering as pre-ovulatory follicle the one that had with a minimum diameter of 7.3mm(Henao, 2010). To measure the pre-ovulatory follicle, the vertical and horizontal axis of the follicle was measured (Corredor and Páez, 2012) .

Experimental design and statistical analysis: A completely randomized design was used,the evaluated variables were presence of corpus luteum and pre-ovulatory follicle, the data obtained were analyzed with PROC GLM of SAS (SAS, 2011)means were compared with Tukey's test ($\alpha = 0.05$).

3. RESULTS AND DISCUSSION

The CC was similar in both groups, 3.5±0.5 points, so it can be inferred that had not effect on the results of ovarian variables evaluated. The results of CL presence and pre-ovulatory follicle size in postpartum Brahman cows are seen in Table 3.

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Lanuza, (2010) and Tovío-Luna and Duica-Amaya (2012) affirm that nutrition plays an important role in reproduction, energy being an extremely important element during the early postpartum period, so that reactivation can occur of ovarian activity. The CC indicates that in both groups the level of thickening was similar and therefore there would be not difference in the energy available for the reactivation of ovarian cyclicity and follicular growth.
However, all the T1 cows presented corpus luteum on day 75 of the study, while 12 cows of group T2 presented corpus luteum. In this same sense, the size of the pre-ovulatory follicle of the T1 cows was bigger than T2, finding statistical differences between groups (Table 3) for both variables.

These results suggest that feeding with ensiled fertilized sorghum during sowing contributed to the restart of ovarian cyclicity and follicle growth.

Motta-Delgado *et al.,* (2011) relates the energy balance, the maximum diameter reached by the dominant follicle, the period calving-first ovulation and corpus luteum first, with the amount of ingested nutrients in the ensiled.

The differences between treatments, in terms of the reactivation of ovarian cyclicity and the size of the pre-ovulatory follicle, could be explained could be explained by it pointed out by Garcés *et al.,* (2004) who indicate that the energy released in the fermentation of glucose to lactic acid is preserved by phosphorylations at the substrate level in the form of highenergy phosphate bonds. In this sense, the lactic acid level of the ensiled was higher in T1 (Table 1), so it could be inferred that the cows consuming this ensiled had more energy than they could have used for follicular growth and formation of a CL.
The differences are more evidents when comparing the results obtained with those reported in grazing Brahman cows, where the pre-ovulatory follicles ranged from 6.8mm to 11.2mm (Henao, 2010). Similar results are reported by García-Bracho *et al.,* (2015) and Ayala *et al.,* (2017).

Table 3. Number of cows with corpus luteum and pre-ovulatory follicle size (mm) of Brahman cows in postpartum anestrus fed with ensiled of sorghum of fertilized sowing (T1) and ofsowing of sorghum without fertilize (T2).

	T1	T2	SEM
Final Body Condition	3.45	3.22	0.02
Number of cows with corpus luteum	26^{b}	12^{a}	0.06
Fol. Size Preovulatory (mm)	18.1^{b}	7.8^{a}	0.12

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ab,means with different letters indicate that there are statistical differences (p> 0.05). T1; cows fed with ensiled of sorghum of fertilized sowing, T2; cows fed with ensiled ofsowing of sorghumnon fertilized.

5. CONCLUSION

To feed with ensiled of fertilized sorghum duringsowing, to cows in the early postpartum period, could favor the restart of the estrous cycle and increase the diameter of the pre-ovulatory follicles.

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