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Nutritional levels during rearing, gestation, and post-calving on the performance of primiparous cows

Níveis nutricionais na recria, gestação e pós-parto no desempenho de vacas primíparas

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Highlights

Primiparous cows needs consistent grazing systems to have higher pregnancy rate.
Improved natural pastures improve heifer body condition score post-calving.
Heifer body weight at the end of the mating period is correlated with pregnancy rate.
Primiparous cows require high nutritional input for subsequent reproduction.

Abstract

This study evaluated the reproductive performance of 36-month-old Hereford primiparous cows (n = 119) fed different nutritional levels during rearing and pre-mating. Nutritional levels were based on two stocking rates (SR) and the use or not of improved pastures. Heifers grazed on natural pastures during rearing at two different SRs (0.8 and 0.6 animal units [AU] per ha). Before the first mating period, each group was allocated either to natural or improved natural pastures at a single SR (0.7 AU ha^{-1}). The better pre-mating live performance of heifers grazing on improved pastures, independently of SR during rearing, was not maintained during gestation, as all heifers achieved similar body weight (BW) and body condition score (BCS) at calving. After calving, cows were allocated to natural or improved natural pastures, independently of the previous feeding system. Except at calving, cows grazing on improved natural pastures showed higher BW, BCS, and BW change until the end of the mating period than those grazing on natural pastures. The higher nutritional levels supplied by improved natural pastures promoted higher pregnancy rates (44.3%) than natural pastures (13.8%). Pregnancy rate increased according to BW range (very light, light, medium, or heavy), with observed values of 0.0, 18.8, 21.2, and 88.0%, respectively. Cows with BCS lower

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than 2.6 did not conceive, whereas a 48.1% pregnancy rate was observed in cows with 2.6-3.4 BCS and a 100% pregnancy rate in cows with 3.5 or higher BCS. Grazing on improved natural pastures during the post-calving period promotes higher body weight and body condition scores in primiparous cows, resulting in higher pregnancy rates.
Key words: Stocking rate. Natural pastures. Improved natural pastures. Pregnancy rate.

Resumo

O objetivo do experimento foi analisar o desempenho reprodutivo de 119 vacas Hereford primíparas aos 36 meses submetidas a diferentes níveis nutricionais durante a recria e pré-acasalamento, que foram estabelecidas a partir de diferentes cargas animais (CA) associadas ou não ao uso de pastagens melhoradas, e no pós-parto com a utilização ou não de pastagens melhoradas. Durante a recria as novilhas foram submetidas a duas CA (0,8 e 0,6 unidades animais [UA] por ha) e, previamente ao primeiro acasalamento, os grupos foram divididos e alocados (0,7 UA ha^{-1}) em pastagem natural ou em pastagem natural melhorada. O melhor desempenho das diferentes CA e da pastagem melhoradas pré-acasalamento quando novilhas não se manteve durante a gestação, chegando as vacas ao parto com pesos e escores de condição corporal (ECC) semelhantes. Após o parto, as primíparas foram distribuídas, conforme os tratamentos anteriores, em dois lotes mantidos sob pastoreio contínuo em pastagem natural ou em pastagem natural melhorada. Com exceção do momento do parto, o peso e o ECC das vacas foram superiores para animais mantidos em pastagem natural melhorada, que também apresentaram maiores variações de peso até o final do período reprodutivo. O melhor nível nutricional ofertado para vacas mantidas em pastagem natural melhorada determinou maiores percentuais de prenhez comparadas com as vacas mantidas em pastagem natural, com valores de 44,3 e 13,8%, respectivamente. Quando os lotes foram estratificados em faixas de pesos em vacas muito leves, leves, médias e pesadas, as taxas de prenhez foram crescentes acompanhando o aumento de peso com valores de 0,0, 18,8, 21,2 e 88,0%, respectivamente. Vacas com ECC inferior a 2,6 pontos não emprenharam. Já vacas com ECC entre 2,6 e 3,4 pontos apresentaram taxa de prenhez de 48,1% e vacas com ECC igual ou superior a 3,5 pontos apresentaram 100% de prenhez. Pastagens naturais melhoradas no pós-parto determinam maior peso e melhor escore de condição corporal em primíparas, sendo os mesmos determinantes de maior taxa de prenhez.
Palavras-chave: Carga animal. Pastagem natural. Pastagem natural melhorada. Prenhez.

Introduction

Beef cattle production involves several processes, and rearing is the costliest phase of this production system, with the lowest economic return for the producer (Gonçalves et al., 2017; F. N. Vaz et al., 2020a). The success of the rearing phase is determined by the efficiency of converting dietary energy into kilograms of weaned calf. That requires supplying the female's requirements for effective nutrient utilization for fetal programming and, after calving, for its body maintenance and production of milk to feed its calf (R. Z. Vaz et al., 2022a).

Calf production begins with selecting future dams, which need adequate body

development to achieve good reproduction indices (Menegaz et al., 2008; R. Z. Vaz et al., 2012; Diskin & Kenny, 2016). One of the measures of beef cow reproductive efficiency is weaning a well-developed calf per year (Lobato et al., 2010). Primiparous cows have high nutritional requirements after calving, as they are still growing during the next mating season. Investing in replacement heifers is pointless if they do not conceive after the first calving, as they are culled for infertility (Lemes et al., 2017).

Good reproductive indices are obtained when cows are sufficiently nourished to achieve adequate BW and BCS (Vieira et al., 2005; R. Z. Vaz et al., 2020b). Cows with adequate BCS at calving (scores 3.0 to 3.5 on a 1-5 scale, where 1 is very thin, 3 moderate, and 5 obese) promptly return to heat and have high reconception rates (Vieira et al., 2005; R. Z. Vaz et al., 2022b). The natural pastures of the pampa biome do not supply the nutritional requirements of primiparous cows primarily because the producers commonly apply high stocking rates (Fagundes et al., 2003). Due to their high nutritional requirements to continue growing, primiparous cows grazing on natural pastures require feed supplementation (Lobato et al., 2021). One alternative to maintaining higher reproduction rates is grazing on natural pastures, improved by introducing higher-quality forage species.

The objective of the present study was to evaluate the body development and reproductive performance of primiparous cows subjected to different feeding regimes as heifers and grazing on improved natural pastures after calving.

Materials and Methods

The experiment was carried out at Agropecuária Xiriscal, located 30° 44′ 676″ South latitude, 54° 47′ 941″ West longitude, and 183 m altitude, in the district of Campo Seco, Dom Pedrito municipality, state of Rio Grande do Sul, Brazil, in the geographic region called *Campanha.* The relief is flat with rolling hills. The soil is classified as eutrophic hydromorphic planosol (Empresa Brasileira de Pesquisa Agropecuária, [1999[), and the climate is subtropical, according to Köppen's classification (Moreno, 1961).

The experiment evaluated a total number of 119 pregnant primiparous Hereford cows.

Cows were randomly distributed into the following grazing systems:

NP – 58 primiparous in natural pastures at a stocking rate (SR) of 315 kg ha^{-1} (equivalent to 0.7 AU ha^{-1}; Animal Unit [UA] = 450 kg body weight) from the first pregnancy diagnosis (27-m-old) until the end of the second mating period as primiparous cows (36-m-old);

INP – 61 primiparous in natural pastures at an SR of 315 kg ha^{-1} (equivalent to 0.7 AU ha^{-1}) until calving (25 to 36 months of age) and, subsequently, improved natural pastures at an SR of 315 kg ha^{-1} (0.7 AU ha^{-1}) until the end of the second mating period.

The evaluated cows were previously submitted as heifers (between 20 and 24 months of age) to different grazing systems during the rearing period before the first mating (Figure 1). The grazing systems consisted of feeding sequences of two different SRs on natural or improved natural pastures during the pre-mating period (Rosa et al., 2012), as described below.

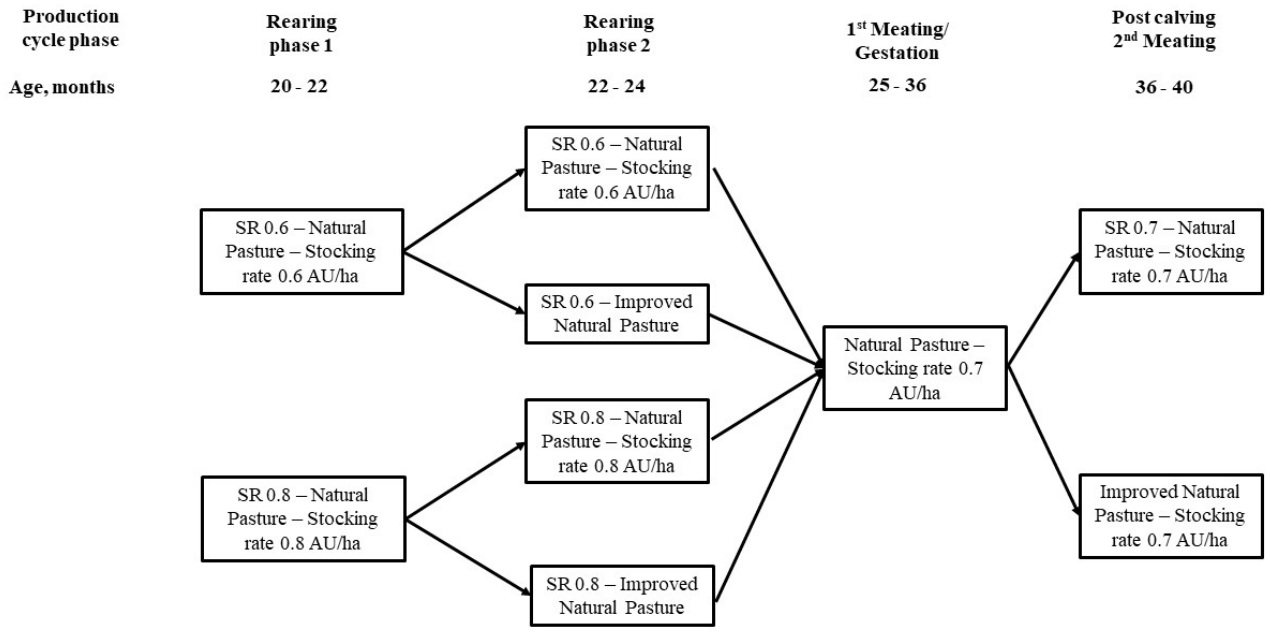

Figure 1. Feeding plan applied between heifer rearing and their second mating as primiparous cows.

Between 20 and 22 months of age, heifers were kept in two 160-ha natural pasture paddocks at SRs of 0.6 or 0.8 AU ha^{-1} (270 and 360 kg BW, respectively.) The natural pasture was predominantly composed of summer species (*Andropogon lateralis, Desmodium incanum, Paspalum dilatatum, Paspalum notatum,* and *Trifolium polimorphum.*)

At 22 months of age, heifers grazing at each SR were homogenously distributed according to BW and BCS into two treatments: half of the heifers were kept on natural pasture and the other half on natural pastures improved by the introduction of ryegrass (*Lolium multiflorum* Lam.), white clover (*Trifolium repens*) and bird's-foot trefoil (*Lotus corniculatus* cv. São Gabriel) until 24 months of age.

Heifers were then managed as a single group on natural pastures during the first mating period, starting at 24.5 months and ending at 26.5 months of age at an SR of 0.7 AU ha^{-1}. Heifers were submitted to artificial insemination during the first 1.5 months of the mating period and to natural mating during the last 0.5 months, after which they continued grazing on natural pastures until calving (Rosa et al., 2012).

Heifers calved between 35 and 37 months of age, predominantly at 36 months of age. Paddocks were surveyed daily to identify calving cows, which were taken to the handling facilities to determine their BW and BCS and for newborn health care within the first 24 hours post-calving.

Cows were subsequently weighed at 28-d intervals after 12-h of solids and liquids fasting. Body weight change was calculated as the difference between the BW measured between weighing dates, divided

by the number of days of each weighing interval. Body condition score (Lowman et al., 1973) was assessed on the days cows were weighed on a 1-5 scale, where score 1 = very thin and score 5 = obese.

Females were strategically dewormed (at the end of the first mating period, at the first pregnancy diagnosis, at the beginning of winter, at calving, at the beginning of the second mating period, and at the second pregnancy diagnosis). All cows were vaccinated against foot-and-mouth disease (in January as per the National Animal Health Authority calendar), clostridiosis (30 days before calving), and babesiosis (in November).

Primiparous cows were 38 months old and 40 months old at the beginning and end of the mating period. Natural mating was applied at a 1:25 bull-to-cow ratio, using bulls previously approved in libido tests and andrological examinations. Pregnancy diagnosis was performed by ultrasound 60 days after the end of the mating period.

The pastures presented variable quantitative and qualitative values according to the time of year (Table 1). On the dates cows were weighed, forage availability was estimated using the comparative method of Haydock and Shaw (1975). Subsamples of the samples collected to estimate forage availability were collected and analyzed for crude protein (CP) and neutral detergent fiber (NDF) contents, according to the methods described by the Association of Official Analytical Chemists [AOAC] (1984). The analyses were conducted in the Animal Nutrition Laboratory of the School of Agronomy of the Federal University of Rio Grande do Sul, Brazil.

Table 1
Forage availability and crude protein (CP) and neutral detergent fiber (NDF) contents (%) of the pastures grazed during the experimental period

Management system	Period	Cow age, months	DM, kg ha^{-1}		CP, %	NDF, %
			Average	Variation		
NP	May – November	32 to 38	1650	1567-1778	6.58	74.59
INP	September – November	36 to 38	1447	1345-1546	9.86	71.70
NP	December – January	39 and 40	2362	2267-2452	7.30	74.40

DM – Forage mass on dry matter basis; NP – Natural pastures; INP – Improved natural pastures; CP - Crude protein; FDN – Neutral detergent fiber.

The experiment was analyzed according to a completely randomized design, with the effect of pasture (natural pasture or improved natural pasture – from 36 to 38 months of age) nested within the previous nutritional management (high or low stocking rate – from 20 to 22 months of age and the use of improved pastures or not –

from 22 to 24 months of age). The data were submitted to analysis of variance according to the mathematical model:

$$Yij = \mu + PREVIOUS_i + PAST(PREVIOUS)_{ij} + eij;$$

Where: Y_{ij} = value of the dependent variable of the k^{th} cow, belonging to the i^{th} PREVIOUS treatment, where 1 = 0.8 AU stocking rate (20-22 months of age) and natural pasture (22-24 months of age), 2 = 0.8 AU stocking rate (20-22 months of age) and improved natural pasture (22-24 months of age), 3 = 0.6 AU stocking rate (20-22 months of age) and natural pasture (22-24 months of age) and 4 = 0.6 AU stocking rate (20-22 months of age) and improved natural pasture (22-24 months of age), at the ij^{th} PAST(PREVIOUS) nested effect of pasture within the previous treatment, with 1 = natural pasture post-calving and 2 = improved natural pasture post-calving; μ = overall mean; e_{ij} = effect of the random error associated with each Y_{ij} observation. Continuous variables with normal distribution were analyzed considering an unequal number of replicates, and means were compared using the Student's t-test.

The different nutritional levels supplied to heifers (20-24 months of age) influenced their development until August of the following year (35 months of age) and one month before calving (36 months of age). However, no effects of previous nutritional treatments were detected at calving, as cows showed similar BW and BCS at calving. Therefore, cows were divided into two homogeneous groups by previous treatment, and variables were analyzed only as a function of post-calving pasture, according to the mathematical model:

$$Yi = \mu + PASTURE_i + e_i;$$

Where: Y_i = value of the dependent variable of the j^{th} cow, belonging to the i^{th} PASTURE, where 1 = natural pasture and 2 = improved natural pasture; μ = overall mean; e_i = effect of the random error associated with each Y_i observation.

Continuous variables with normal distribution were analyzed considering an unequal number of replicates using the F test. The effects of feeding management on pregnancy rate were analyzed using the chi-squared test at a 5% probability level.

Results and Discussion

Heifer BW at the end of the first mating period was influenced by SR treatments on natural pastures until 22 months of age and SR and the use of natural or improved natural pastures from 22 to 24 months of age (Rosa et al., 2012). The heifer BW differences as a function of pre-mating nutritional levels were maintained during the mating period. However, such differences were no longer detected during gestation (Table 2), indicating no residual effect of pre-breeding nutritional treatments, as shown by their similar BW ($P>0.05$) at calving (Table 3).

As shown in Table 2, independently of SR, improved natural pastures promoted higher BW and BCS between the end of the mating period and pregnancy diagnosis compared with natural pastures due to the higher daily weight gain (DWG) and total BW of the heifers supplied with higher nutritional levels before mating (Rosa et al., 2012).

Table 2
Body weight, body weight change, and body condition score (mean and standard error) from the end of the mating period (26 months of age) to calving (36 months of age) of heifers grazing at two different stocking rates and on natural or improved natural pastures during the pre-mating period

Parameter	0.6 AU ha^{-1}		0.8 AU ha^{-1}	
	NP	INP	NP	INP
Body weight, kg				
End of first mating[1] (26 months)	294.0±2.0^{b}	320.0±3.0^{a}	278.0±2.0^{b}	316.0±3.0^{a}
Pregnancy diagnosis (27 months)	326.9±4.3^{b}	346.6±4.4^{a}	317.1±5.4^{b}	344.9±4.8^{a}
Gestation (32 months)	359.9±4.5^{b}	377.7±4.6^{a}	353.6±5.7^{b}	377.9±5.0^{a}
Gestation (33 months)	384.5±4.6^{b}	401.8±4.7^{a}	376.4±5.8^{b}	400.2±5.1^{a}
Gestation (34 months)	387.3±4.8^{b}	403.1±5.0^{a}	377.0±6.0^{b}	397.4±5.4^{a}
Gestation (35 months)	383.8±4.6^{ab}	396.7±4.8^{a}	369.3±5.7^{b}	394.2±5.0^{a}
Gestation (36 months)	374.9±5.0^{a}	383.3±5.2^{a}	370.0±6.5^{a}	382.8±5.4^{a}
BW change from pregnancy diagnosis to calving				
Average daily BW gain, kg/d	0.311±0.02^{ab}	0.240±0.02^{b}	0.345±0.02^{a}	0.253±0.02^{b}
Total BW gain, kg	46.7±3.0^{ab}	35.9±3.1^{b}	51.7±4.0^{a}	37.9±3.3^{b}
Body condition score				
End of mating[1]	2.8±0.03^{b}	3.3±0.05^{a}	2.6±0.03^{b}	3.2±0.05^{a}
Pregnancy diagnosis (27 months)	3.0±0.06^{b}	3.3±0.06^{a}	3.0±0.07^{b}	3.2±0.06^{a}
Gestation (32 months)	3.2±0.05^{b}	3.4±0.06^{a}	3.2±0.07^{b}	3.4±0.06^{a}
Gestation (33 months)	3.0±0.06^{ab}	3.1±0.05^{a}	2.9±0.06^{b}	3.0±0.05^{ab}
Gestation (34 months)	3.0±0.05^{a}	3.2±0.05^{a}	2.9±0.06^{b}	3.1±0.06^{a}
Gestation (35 months)	2.9±0.07^{ab}	3.1±0.07^{a}	2.7±0.09^{b}	3.0±0.08^{a}
Gestation (36 months)	2.7±0.06^{a}	2.9±0.06^{a}	2.7±0.08^{a}	2.8±0.07^{a}

[1]Results of Rosa et al. (2012).
NP – Natural pastures; INP – Improved natural pastures;
^{a,b} Superscripts in the same row indicate significant differences (P<0.05) by the Student's t-test.

Table 3
Body weight, body weight change, and body condition score (means and standard errors) during lactation of primiparous cows grazing on natural and improved natural pastures

	NP	INP
Body weight, kg		
At calving	353.0±4.9[a]	353.5±4.9[a]
Lactation (37 months)	312.7±5.3[b]	347.6±5.3[a]
Lactation (38 months)	302.0±4.4[b]	332.5±4.3[a]
Lactation (39 months)	310.4±4.4[b]	345.4±4.3[a]
Lactation (40 months)	328.7±4.4[b]	358.4±4.3[a]
Lactation (End of reproductive period) (40.5 months)	336.9±4.4[b]	362.7±4.3[a]
BW change from calving to the end of the mating period		
Daily BW gain (kg/d)	-0.132±0.018[a]	0.075±0.012[b]
Total BW gain	-16.1±2.1[a]	9.2±2.0[b]
Body condition score		
At calving	2.54±0.08[a]	2.74±0.08[a]
Lactation (37 months)	2.12±0.07[b]	2.43±0.07[a]
Lactation (38 months)	1.91±0.05[b]	2.38±0.05[a]
Lactation (39 months)	2.10±0.05[b]	2.71±0.05[a]
Lactation (40 months)	2.47±0.07[b]	3.10±0.06[a]
Lactation (End of the reproductive period) (40.5 months)	2.53±0.07[b]	3.12±0.07[a]

NP – Natural pastures; INP – Improved natural pastures.
[a,b] Superscripts in the same row indicate significant differences (P<0.05) by the F test.

However, between mating and calving, heifers fed lower nutrition levels pre-mating showed higher DWG and maintained their BCS, whereas those reared at higher nutritional levels pre-mating experienced BW and BCS losses during the same period. Smaller and lighter beef cows, due to their lower maintenance requirements, adapt more easily to suboptimal feeding conditions (Farias et al., 2018; R. Z. Vaz et al., 2022a). Furthermore, feed changes and declining nutritional quality hinder the performance of previously well-fed heifers, whereas those submitted to worse nutritional conditions are unaffected.

The high SR associated with the low quality of the natural forage supplied (Table 1) may have limited heifer development (National Research Council [NRC], 2016) as their requirements increase during gestation (Klein et al., 2021). Heifer BW increases during the final third of pregnancy due to the growth of the fetus and fetal membranes and the accumulation of fetal fluids; however, this is not reflected in BCS increase (Klein et al., 2021).

After calving, cows mobilize their body reserves to maintain lactation and manifest heat. Therefore, inadequate nutrition during

the first pregnancy results in poorer heifer body development. Primiparous cows must accumulate body fat for the next breeding cycle, as the return to heat positively correlates with body reserves (Tanure et al., 2011).

The pre-mating low SR and improved natural pasture feeding system supplied higher nutritional levels, consequently promoting higher BW and BCS. However, as the natural pasture and the suboptimal SR conditions to which heifers were submitted during gestation did not fully supply their nutritional requirements, their better growth performance was not maintained as gestation advanced. Consequently, no heifer BW or BCS differences were observed at calving ($P>0.05$).

After calving, at 36 months of age, cows were allocated to either natural or improved natural pastures. Improved natural pastures promoted higher BW and BCS ($P<0.05$) compared with natural pastures until the end of the experiment, at 40.5 months of age (Table 3). Those results may be explained by the better forage quality of the improved natural pasture, supplying lactation nutritional requirements of primiparous cows, which are comparatively higher than those of cows in their second parity or higher (Lemes et al., 2017).

Milk production negatively influences the return to heat, as the cow's metabolism prioritizes milk production over ovarian activity. When the nutrients available are insufficient to supply their body maintenance and milk production requirements, cows mobilize their body reserves to maintain milk production to promote calf growth (R. Z. Vaz & Lobato, 2010).

Independently of pasture quality supplied post-calving, cow BW ($P<0.05$) decreased between calving and the beginning of the next mating period (Table 3). That may be explained by the increase in cows' nutritional requirements until the peak of lactation, which occurs 60 days post-calving, on average. After the peak of lactation, milk production decreases as the calf's dependence on milk is reduced (Cerdótes et al., 2004).

During the lactation period, although cows grazing on natural pastures lost BW (-0.132 kg d^{-1}), their BCS at calving was maintained (Table 3), whereas positive BW and BCS changes were observed in cows grazing on improved natural pastures. Positive BW changes during the breeding season are essential for the success of cows' subsequent reproduction (Vieira et al., 2005; Lobato et al., 2021). In primiparous cows, suboptimal BW and BCS commonly cause reproductive failure (Bitencourt et al., 2020). Such cow category requires a dedicated feeding management system that supplies both their reproductive and growth requirements. Rodríguez-Sánchez et al. (2018) observed that high dietary nutrient levels promote high pregnancy rates in primiparous cows. On the other hand, the nutritional requirements of multiparous cows, as they are no longer growing, are more easily met (Bitencourt et al., 2020). Evaluating BW variations during the breeding season, Vieira et al. (2005) obtained a 54.8% pregnancy rate in primiparous cows with 120-kg BW loss, while multiparous cows with the same BW loss showed an 88.9% pregnancy rate. Moreover, cows with high average daily gain and BCS conceive early in the breeding season (Tanure et al., 2011; Lobato et al., 2021; Cooke et al., 2021).

In the present experiment, the pregnancy rate of primiparous cows grazing on improved natural pastures was 210% higher than those grazing exclusively on natural pastures (Table 4) due to their higher weight gain and BCS (Table 3) promoted by the higher nutritional levels supplied. Post-calving nutritional levels have little influence on the reproductive activity of cows with good BCS at calving; however, they are decisive when cows are subjected to nutritional deficiencies pre-calving, as in the present study.

Table 4
Reproductive performance of 36-month-old primiparous cows as a function of post-calving feeding, body weight class, and body condition score at the end of the mating period

	Pregnancy rate, %
Feeding	
Natural pasture	13.8[b]
Improved natural pasture	44.3[a]
Body weight class	
Very light	0.0[c]
Light	18.8[b]
Moderate	21.2[b]
Heavy	88.0[a]
*Body condition score**	
≤ 2.5	0.0[c]
2.6 to 3.4	48.1[b]
≥ 3.5	100.0[a]

* 1 - very thin, 2 - thin, 3 - moderate, 4 - fat, 5 – obese.
[a,b,c] Superscripts within the same source of variation differ (P<0.05) by the chi-square test.

The leading causes of low reconception rates are low BCS (Vieira et al., 2005; Diskin & Kenny, 2016; Cooke et al., 2021), particularly in cows that are still growing (Vieira et al., 2005; Bitencourt et al., 2020) and old cows (Vieira et al., 2005), and low pre- and post-calving nutritional levels (Lobato et al., 2010; Añez-Osuna et al., 2019; Klein et al., 2021).

Despite the higher pregnancy rate of cows grazing on improved natural pastures compared with those maintained on natural pastures, the obtained rate of 44.3% is lower than expected for primiparous cows. Primiparous cow reproductive failure represents the loss of investments in heifer development and pregnancy (Menegaz et al., 2008; Pilau & Lobato, 2009).

In the present study, the low pregnancy rate of primiparous cows is attributed to their low first-calving BW and BCS associated with insufficient nutrition during lactation, which

was concomitant with the mating period. The poor quality of the natural pastures offered during the mating period (7.30% CP and 74.4% NDF) did not supply the primiparous cows' body maintenance, growth, lactation, and reproduction requirements. Fagundes et al. (2003) obtained a 22.3% pregnancy rate in primiparous cows grazing on natural pastures at a high SR (0.8 AU ha^{-1}), whereas those grazing at a lower SR (0.6 AU ha^{-1}) were provided with higher forage allowance and were able to select the forage, showing a 66.7% pregnancy rate. That result demonstrates that primiparous cow nutritional requirements were met at the lower SR applied despite grazing exclusively on natural pastures. Higher pregnancy rates were observed in primiparous cows grazing on improved natural pastures relative to natural pastures (Lobato et al., 2010). Higher pregnancy rates were achieved by adjusting SR (Fagundes et al., 2003). Several studies report higher pregnancy rates in primiparous cows grazing on natural pastures fed supplements, such as that of Klein et al. (2021), who provided supplements at 100 and 150% of cows' maintenance protein and energy requirements during the pre-calving period. The supply of canola or linseed as energy supplements (Añez-Osuna et al., 2019) or soybean meal as a protein supplement (Rubio et al., 2021) also promoted higher pregnancy rates in primiparous cows. In the present study, independently of post-calving dietary levels, primiparous cow BW and BCS at the end of the mating period influenced pregnancy rates, with 88.0 and 100.0% pregnancy rates obtained in cows classified as heavy and presenting ≥3.5 BCS at the end of gestation, respectively.

Conclusions

The effects of better nutrition conditions provided to heifers during rearing is maintained until the final third of the first pregnancy, but it does not influence their body weight and body condition score at calving as primiparous cows at 36 months of age.

Improved natural pastures offered to primiparous cows post-calving result in high body weight and body condition score, resulting in high pregnancy rates.

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