Influence of body score on bovine female reproduction

Karlany Victoria Pereira Soares[1], Renê Ferreira Costa[2], Juddy de Souza Coutinho[3], Jaine Aparecida dos Santos[4], Adriane Stefany Batista dos Santos[5], Leandra Soares Cristina[6], Maria Clara Chaves Lima[7], Ana Ariela Gusmão Versiani[8], Otaviano de Souza Pires Neto[9], Daniel Ananias de Assis Pires[10], Isadora Leite e Lopes[11] and Isadora Vieira Santos Araujo[12]

ABSTRACT

The objective of this study was to evaluate the influence of the body condition score (BCS) on the pregnancy rate of female cattle submitted to TAI. This was a cross-sectional, descriptive and quantitative study, in which data collection were carried out on bovine reproduction. A population of 600 Nellore females was used, submitted to artificial insemination at a fixed time, submitted to the same FTAI protocol and classified according to the body condition score (BCS) being: low (with index less than 2.5), medium (between 2.6 and 3.0) and high (above 3.1). After data collection, they were organized in excel spreadsheets, in addition to using the graphs available in the tool to treat the information. Through the results obtained with this work, it is concluded that body condition exerts a significant influence on the percentage of pregnancies of animals submitted to the Fixed Time Artificial Insemination (FTAI) program.

Keywords: TAI, Body score, Pregnancy rate.

[1] Undergraduate student in Veterinary Medicine/Unimontes

[2] MSc in Animal Production// Unimontes

E-mail: renecostavet@gmail.com

[3] Undergraduate student in Veterinary Medicine/Funorte

[4] Undergraduate student in Veterinary Medicine/Funorte

[5] Undergraduate student in Veterinary Medicine/ UNA University Center

[6] Master's student in Animal Production/ Unimontes

[7] Master's student in Plant Production / Unimontes

[8] Master's student in Animal Production/ Unimontes

[9] Doctor in Animal Production/ Unimontes

[10] Doctor in Animal Production

[11] Master's student in Animal Production ICA/UFMG

[12] Master's student in Animal Production/ Unimontes

INTRODUCTION

With the growing demand of the world market in the purchase of beef for human consumption, it requires great efforts from producers and the agricultural sector emerges as one of the main activities for commercial exploitation, making the activity propitious and very competitive in several segments of activity (EMBRAPA, 2021). In the agribusiness scenario, cattle farming in Brazil is an extremely important practice in the country, with a turnover of US$$ 2.58 billion until August 2022, beef exports had an increase of more than 23% compared to the same period in 2021, one of the largest buyers is the Asian market, which corresponds to 62.4% of all exports of beef products in the country (MAPA, 2022). Due to this high demand for high-quality animal protein, the use of reproductive biotechnologies in order to facilitate and accelerate the production of animal protein is indispensable (BARUSELLI et al., 2018; MAPLETOFT *et al*., 2018).

The adoption of the breeding season enables the standardization of calf lots, resulting in greater bargaining power and competitiveness in the market, in addition to increasing reproductive efficiency, concentrating calving by establishing a birth season, establishing the formation of uniform batches of calves, establishing a weaning station, is easy to adopt in any property, it helps to concentrate management activities, which optimizes employee operations, makes it easier to identify females with low production rates, helping to guide culling (LINO, 2021).

According to Baruselli, (2022), in Brazil in 2021 there was a growth of (24.6%) in the search for fixed-time artificial insemination (FTAI) protocols, compared to the previous year and (20%) in the number of semen doses marketed compared to 2020.It is important to emphasize that the efficiency of the FAI is directly related to the nutritional and sanitary management strategies of animals, as well as the execution, dosage and type of hormonal compounds and materials used in the FTAI protocols. Thus, the evaluation of alternative protocols that meet the demand and availability of local inputs becomes an indispensable factor for the success of the technique (ALVARADO-ESPINO *et al.,* 2019)

The effects of body condition on fertility are noticeable, and there is a positive relationship between the weight and body condition of cows and reproductive performance (BITENCOURT, 2018). The body condition of each female is correlated with the fertility of the herd, and generally animals with good BCS will have a more satisfactory response to ovulation induction and synchronization protocols, thus ensuring better pregnancy rates and reproductive outcomes, concluding that the body condition score (BCS) is an important predictor of fertility (ABREU; SILVA; GOTTSCHALL, 2018). In view of the considerations presented above, the present study aims to evaluate the influence of body condition score (BCS) on the pregnancy rate of bovine females submitted to fixed-time artificial insemination (FTAI) through data collected at the company Reproduce – Animal Reproduction in the city of Montes Claros – MG.

MATERIALS AND METHODS

This is a cross-sectional, descriptive study with quantitative analysis. The experiment in the city of Montes Claros, Minas Gerais, Brazil.

The animal husbandry contained the date of the FTAI management, the shift in which the animals were submitted to the FTAI, batch, veterinarian responsible for the protocol, number of animals in the batch, description of the batch, identification of the hormonal protocol, identification of the animal (earring or hot mark), reproductive category, situation (presence or absence of the calf at the foot of the cow), body condition score (BCS), breed, ovarian structure, days of management after the beginning of the protocol, bull, origin of semen, inseminator and diagnosis of pregnancy. The animals were kept in an extensive system in pastures of Brachiaria SP, Panicum maximum, Andropogon, Bufell and received mineral supplementation ad libitum, not interfering in the management, according to the time of year and according to the conditions of each property.

The parameters evaluated were animal category, submitted to the same FTAI protocol and classified according to the body condition score (BCS) being: low (with index less than 2.5), medium (between 2.6 and 3.0) and high (above 3.1).

After data collection, they were organized in Excel spreadsheets. In addition to using the graphs available in the aforementioned tool, new tables and graphs were created to better interpret the results. Only animals that have complete and usable information were used.

RESULTS

From the information obtained from Nellore cattle females submitted to the fixed artificial insemination protocol, 600 animals had a positive diagnosis for final pregnancy (TAI), closing the breeding season from February to April 2023 with a final pregnancy rate of 59.83%. According to Siqueira *et al.,*(2008) , pregnancy rates around 50% can be considered reasonable, and inferior results are unsatisfactory, as they do not justify the costs of implementing the hormonal protocol and management. The percentage of pregnant females at the end of the breeding season obtained in this study would justify the use of FTAI. Carvalho *et al.*, (2019).

After the implementation of the FTAI protocol in the selected flocks, it was observed that the animals with a score of 3.00 had a higher pregnancy rate when compared to the animals with a score of 2.5 and 3.25.

According to the data collected from the animals, we can see below in table 1 the bovine females with the highest pregnancy rates.

Table 1: Pregnancy rate of animals

Order/ECC	Total inseminations	Total de DG	Total de Prenhez	Prenhez's rate to the IATF	Distribution (100%)
Bovine females	600	600	359	59,83	100
2,5	200	200	111	55,50	100
3,0	200	200	159	79,50	100
3,5	200	200	89	44,50	100
Total	600	600	359	59,83	

Source: Survey data (2023)

DISCUSSION

Brazil is currently one of the main players in the production and trade of beef in the world, a reflection of a structured development process that has increased not only productivity but also the quality of the Brazilian product and consequently its competitiveness and market coverage. (EMBRAPA, 2017).

Beef cattle production was highly represented, both in the Brazilian GDP and in the agribusiness GDP. It also showed significant growth in the analysis period. In numbers, it alone accounted for 25.98% of the total agribusiness GDP and 3.64% of Brazil's total GDP (MALAFAIA, et al., 2021).

Reproductive planning on a property becomes, therefore, of fundamental importance to increase the reproductive efficiency of cattle, having an impact on Brazil's GDP (ABIEC, 2020).

The research showed that, with the implementation of methods to improve bovine reproduction and adequate compliance with nutritional requirements in the various stages of reproductive life, it is of fundamental importance for the optimization of the reproductive performance of the herd and, above all, for the maximization of the fertility of the breeding females.

The pregnancy rate of females submitted to the FTAI protocol was 59.83%. Animals with BCS (2.5) and 3.0) showed better results in the FTAI protocols compared to animals with CCS (3.25) as shown in Table 2. It is the result of a number of factors, one of the main ones being the body condition of the female.

Table 2: Pregnancy rate of animals
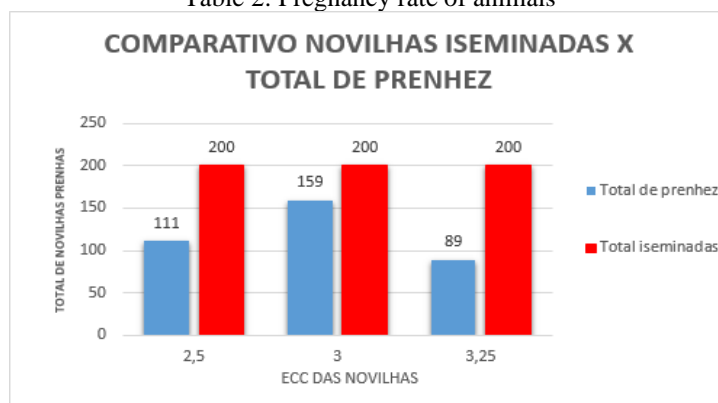
Source: Survey data (2023).

The body score was based on the subjective analysis of the nutritional status of the animals by means of visual evaluation of the veterinarians who were starting the protocol as a function of muscle coverage and fat mass, on a scale from 1.0 to 5.0 (1 = very thin to 5 = very fat), according to the method developed by Houghton et al. (1990). Adapted for 0.25 intervals.

Animals that have low body condition and are included in the FTAI protocol tend to interfere negatively in the pregnancy rate assessments, as well as animals with high scores, since the accumulation of fat in the reproductive organs can interfere with the estrous cycle. Therefore, for the optimization of the results, it is preferable that the animal presents an intermediate body condition, that is, between 2.5 and 3.0 due to animals with a normal cyclic activity and adequate weight (TORRES et al., 2015).

It is extremely important to emphasize that not only the use of adequate TAI, but also the implementation of other management practices in a property such as good management of nutritional management, monitoring of the CCS of females in the different stages of their reproductive life and adequate supply of their nutritional requirements, will provide a maximization of fertility in beef females. as well as the optimization of the reproductive performance of the herd as a whole, resulting in a considerable increase in the quality and productivity of kilos of calf/ha/year (raw material of this market), increasing our competitiveness in the world meat market. (Torres Junior *et al*., 2009).

CONCLUSION

Through the results obtained with this work, it is concluded that the body condition exerts a significant influence on the percentage of pregnancies of the animals submitted to the Fixed Time Artificial Insemination (FTAI), where animals with scores higher than 3.00 obtained lower percentages when compared to animals with body condition 2.5 to 3.0.

It is verified that animals with BCS 3.0 have pregnancy averages above 50% indicated by the literature. Therefore, for the successful reproductive management of a herd, it is essential to adopt an adequate nutritional management to improve the body condition of the animals included in the

reproductive program.

REFERENCES

1. Alvarado-Spino, A. S., Menchaca, A., Meza-Herrera, C. A., Mellado, M., Arellano, F., & Véliz, F. (2019). Use of injectable progesterone and hCG for fixed-time artificial insemination during the non-breeding season in goats. *Theriogenology, 127,* 21-25.

2. Baruselli, P. S. (2022). IATF bate mais um recorde e supera 26 milhões de procedimentos em 2021. *Boletim Eletrônico do Departamento de Reprodução Animal/FMVZ/USP, 6a ed.* Recuperado de http://vra.fmvz.usp.br/boletim-eletronico-vra/

3. Bitencourt, M. F. (2018). Idade e época de parição na eficiência de vacas de corte e seus bezerros. Dissertação de mestrado, Programa de Pós-Graduação em Zootecnia, Universidade Federal de Pelotas. Recuperado de https://pesquisa.bvsalud.org/portal/resource/pt/vtt-215699

4. Carvalho, J. S., Cavalcanti, M. O., Chaves, M. S., & Rizzo, H. (2019). Eficiência da inseminação artificial em tempo fixo em fêmeas zebuínas na mesorregião Sudeste do Pará, Brasil. *Revista de Ciências Agrárias Amazonian Journal of Agricultural and Environmental Sciences, 62.*

5. EMBRAPA. (2018). Qualidade da carne bovina. Recuperado de https://www.embrapa.br/qualidade-da-carne/carne-bovina

6. EMBRAPA. (2015). Nutrição de bovinos de corte. Recuperado de https://ainfo.cnptia.embrapa.br/digital/bitstream/item/120040/1/Nutricao-Animal-livro-em-baixa.pdf

7. Lino, F. Estação de monta: tudo o que você precisa saber! Recuperado de https://www.irancho.com.br/estacao-de-monta-tudo-que-voce-precisa-saber/

8. MAPA – Ministério da Agricultura, Pecuária e Abastecimento. (2022). Balanço Comercial do Agronegócio. Recuperado de https://www.gov.br/agricultura/pt-br/assuntos/noticias-2022/brasil-exporta-us-14-8-bilhoes-em-produtos-do-agronegocio-em-agosto/Notaaimprensa08_2022.pdf

9. Medeiros, S. R. de, Gomes, R. D. C., & Bungenstab, J. D. (2015). Nutrição de bovinos de corte (1. ed., Vol. 1). Recuperado de https://ainfo.cnptia.embrapa.br/digital/bitstream/item/120040/1/Nutricao-Animallivro-em-baixa.pdf

10. Siqueira, L. C., Oliveira, J. F. C. D., Loguércio, R. D. S., Lof, H. K., & Gonçalves, P. B. D. (2008). Sistemas de inseminação artificial em dois dias com observação de estro ou em tempo fixo para vacas de corte amamentando. *Ciência Rural, 38,* 411-415.

11. Ferreira, A. de M., & Torres, C. A. A. (1993). Perda de peso corporal e cessação da atividade ovariana luteínica cíclica em vacas mestiças leiteiras. *Pesquisa Agropecuária Brasileira, 28*(3), 411-418.

12. Torres Junior, J. R. S., Melo, W. O., Elias, A. K. S., Rodrigues, L. S., Penteado, L., & Baruselli, P. S. (2009). Considerações técnicas e econômicas sobre reprodução assistida em gado de corte. *Revista Brasileira de Reprodução Animal, 33*(1), 53-58.

13. Wicpolt, N. S., et al. (2019). Experimental reproduction of congenital anomalies in the progeny of cows fed apple pomace during pregnancy. *Pesquisa Veterinária Brasileira, 39*(6), 371-375. doi: 10.1590/1678-5150-pvb-6119