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Comparison Between Intracornual Artificial Insemination and Uterine Body Deposition in Holstein-Friesian Heifers

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ABSTRACT

Two insemination types were compared: intracornual and uterine body deposition in 40 Holstein-Friesian heifers in the province of Azuay, Cuenca Region, Cumbe and Victoria Portete Parishes. The animals were over 18 months old, weighing more than 300 kg; physical condition score of 2.5-3.5, and similar management and hygiene conditions. Each treatment was randomized in 4 blocks with 5 heifers each. Functional corpus luteum was determined by ultrasound scanning. PGF2 α (250 mcg d-cloprostenol) was used for estrus synchronization. Estrus occurred at 48 and 72 h, and the size of the pre-ovulatory follicle was measured. Then, the two techniques were used to inseminate the animals. Gynecological checkup was performed 30 days after to assess pregnancy percent. Uterine body deposition was 35 %, whereas intracornual deposition was significantly higher (70 %).

Key words: reproduction, dairy cattle, artificial insemination, PGF2 α

INTRODUCTION

Deep intracornual deposition consists of placing the insemination pistol on the cranial area of the ipsilateral horn, to the ovary where ovulation will take place. Serrano (2009) and Verberckmoes *et al.* (2004) recommended this method to achieve higher percent of pregnancy, as spermatozoa loss is reduced due to the retrograde flux of the cervical mucus and phagocytosis, during migration to the uterus. Meirelles *et al.* (2012) and López-Gatius *et al.* (2000) also proved the superiority of this method, in comparison insemination studies with deposition in the uterus corpus. However, other studies (Kurykin *et al.*, 2006) in heifers from dairy breeds failed to show superiority.

Considering the different results, two seminal deposition methods were compared: in the uterus corpus, and intracornual, in Holstein-Friesian heifers, using PGF2 α for estrus synchronization.

MATERIALS AND METHODS

Localization

Research was done in the Anzuay province, Canton¹ Cuenca, in the Cumbres and Victoria del Portete Parrishes, La Merced, Los Alamos, Iruquis, and San Agustín sectors; areas for milk production and Holstein exploitation.

¹ Cantons are second-level administrative divisions in Ecuador. The republic is divided into 24 provinces, which in turn, are divided into 221 cantons. The cantons are divided into urban and rural parishes (from the Editor).

Husbandry

The 40 Holstein-Friesian heifers were older than 18 months, weighed more than 300 kg, body condition of 2.5-3.5, and similar husbandry and health conditions. Exploitation was based on free grazing (kikuyo, rye grass and clove), contributing with 17 % protein, metabolizable energy of 2.2 Mcal/kg MS, and supplementation with commercial concentrate of 6 kg of MS per heifer/day, along with 80 g/day of mineral salts.

Two treatments were compared: insemination by depositing in the uterus corpus, and insemination by intracornual deposition. The treatments were randomly distributed in 4 blocks made of 10 heifers each, and 5 heifers in each treatment.

The pregnancy variable was arcsin transformed in order to apply double variance analysis, using SPSS (2010).

Field activities during research

1. Review of records for data collection (age, and previous estrus dates).
2. Physical examination to determine animal body condition and weight.

Ultrasound scanning with a 7.5 MHZ probe was made to examine the uterus, cervix, horns and corpus, and also to verify the absence of malformations or pregnancy. Both ovaries were examined to identify the presence of essential luteal corpus for application of 250 mcg D-Cloprostenol (PGF2 α) (Estrumate, Spain).

Estrus was verified by ultrasound scanning at 72 h to locate the ovary with the pre-ovulating follicle. Then artificial insemination was per-

formed, sorting the two techniques: deposition in the uterus, and intracornual deposition to all the animals by the same operator.

A final scanning was performed after 30 days to determine the presence or absence of pregnancy. Digital UltraSonic MINDRAY 6000 VET was used with a 7.5 MHz linear probe, and a 10" 75L 50EAV/50L60EAV monitor.

RESULTS AND DISCUSSION

The sample's characteristics were homogeneous for all the treatment in the blocks and between them. No significant differences were observed, except for block weight, which ratified the need for this design (Table 1).

The body condition levels met the requirements for heifer incorporation to reproduction. Carvalho *et al.* (2014) found a low pregnancy percentage in body conditions (below 2.5 (40.1)): and a high percentage (above 2.75).

Chrenek *et al.* (2014) noted that deficient body condition has effects on conception, due to oocyte initial quality alteration.

The pregnancy percent achieved with the uterus treatment was 35 %; whereas the intracornual treatment produced 70 % pregnancy in the heifers, which shows superiority (Table 2)

Similar results were achieved by Kurykin *et al.* (2003), using heifers of the same breed, synchronization of low and high sperm concentration, and with deposition in the uterus. Moreover, Meirelles *et al.* (2012) found significant differences in Nelore, using a single dose and synchronization, when comparing intracornual and uterus inseminations. A research showed that Holstein-Friesian heifers did not show significant differences between the two types (Kurykin *et al.*, 2010).

The spots for semen deposition have not provided significant differences in various researches. Kurykin *et al.* (2006) inseminated the mid part of the horn, with deep deposition, but superiority was not observed.

There is no evidence that support the theory of superiority of using semen at a low concentration (2.5×10^6), or at a higher concentration (10×10^6), as in a study by Silveira *et al.* (2013). The results from sexed and unsexed semen also failed to show differences (Kurykin *et al.*, 2010); though Karakaya *et al.* (2014), found favorable results at 62 days using unsexed semen, but significant differences were not observed.

Pregnancy levels for intracornual insemination of Holstein-Friesian heifers were between 56.9-68 %, Kurykin *et al.* (2013). In 2006, Kurykin *et al.* (2006) found 27 % pregnancy in the same breed; whereas Meirelles *et al.* (2012) found 67.4 % in Nelore.

CONCLUSIONS

Holstein-Friesian heifers that received prostaglandins and were inseminated with the deep intracornual procedure deposition showed higher pregnancy percent than heifers that were inseminated in the uterus.

REFERENCES

- CARVALHO, P. D.; SOUZA, A. H.; AMUNDSON, M. C.; HACKBART, K. S.; FUENZALIDA, M. S.; HERLIHY, M. M.; AYRES, H.; DRESCH, H. R.; VIEIRA, L. M.; GUENTHER, J. N.; GRUMMER, R. R.; FRICKE, P. M.; SHAVER, R. D. and WILTBANK, M. C. (2014). Relationships between Fertility and Postpartum Changes in Body Condition and Body Weight in Lactating Dairy Cows. *J. Dairy Sci.*, 97, 3666-3683.
- CHRENEK, P.; KUBOVICŔOVÁ, E.; OLEXÍKOVÁ, L.; MAKAREVICH, V. A.; TOPORCEROVÁ, S. and OSTRŔ, A. (2014). *Effect of Body Condition and Season on Yield and Quality of In Vitro Produced Bovine Embryos. Zygote*. Cambridge University Press.
- SPSS (2010). SPSS (ver.19). IBM company.
- KARAKAYA, E.; YILMAZBAS-MECITOG, G.; KESKIN, A.; ALKAN, A.; TASDEMIR, U.; SANTOS, J.E.P. and GUMEN, A. (2014). Fertility in Dairy Cows After Artificial Insemination Using Sex-Sorted Sperm or Conventional Semen. *Reprod. Dom. Anim.*, 49, 333-337.
- KURYKIN, J.; JAAKMA, U.; MAJAS, L.; JALAKAS, M.; AIDINIK, M.; WALDMAN, N. A. y PADRIK, P. (2013). Fixed Time Deep Intracornual Insemination of Heifers at Synchronized Estrus. *Theriogenology*, 60, 1261-1268.
- KURYKIN, J.; JAAKMA, U.; WALDMAN, N. A.; JALAKAS, M.; AIDINK, M.; MAJAS, L.; PADRIK, P. (2006). Low Semen Dose Intracornual Insemination of Cows at Fixed Time after PGF2 α Treatment or at Espontaneous Estrus. *Animal Reproduction Science*, 95, 116-124.
- KURYKIN, J.; JAAKMA, U.; WALDMAN, N. A.; JALAKAS, M.; AIDINK, M.; MAJAS, L. y PADRIK, P. (2010). Pregnancy Rates in Estonian Holstein Heifers after Insemination with Sexed Sperm. *Reproduction Fertility and Development*, 23 (1), 112-112.
- LOPEZ-GATIUS, F. (2010). Site of Semen Deposition in Cattle: a Review. *Theriogenology*, 53, 7, 1407-14.

MEIRELLES, C.; KOSICKI, L. E.; WEISS, R. R.; SEGUÍ, M. S.; SOUZA, A.; SANTOS, I. W. y BREDA, J. C. S. (2012). Comparison Between Deep Intracornual Artificial Insemination (DIAI) and Conventional Artificial Insemination (AI) Using low Concentration of Spermatozoa in Beef Cattle. *Braz. Arch. Biol. Technol.*, 55 (3), 371-374.

SERRANO, J. (2009). Uso semen sexado. Retrieved in 2014, from <http://jairoserano.com/2009/02/usando-semen-sexado>.

SILVEIRA, E. C.; BORTOLLOTTI, L. A.; MOROTTI, F.; SILVA-SANTOS, K. C.; SANTOS, G. M. G. *et al.* (2013). Insemination of Four Cows per Dose of Frozen Semen with a Fixed-Time Artificial Insemination Protocol. *Anim. Reprod.*, 10 (2), 124-126.

VERBERCKMOES, S.; VAN SCOOM, A.; DE PAUW, I.; DEWULF, J. *et al.* (2004). Assessment of a New Utero-Tubal Junction Insemination Device in Dairy Cattle. *Theriogenology*, 61, 103-115.

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Table 1. Sample characteristics

Repetitions	Body condition			Age (months)			Weight (kg)			Follicular size (mm)		
	A	B	± ET	A	B	± ET	A	B	± ET	A	B	± ET
I	3.1	3.2	0.07	20.0	19.4	0.66	321.2	308,0	20.27	12.6	11.2	0.83
II	3.2	3.1	0.09	20.8	20.0	1.12	344.0	340,0	20.60	12.3	13.7	0.92
III	3.1	3.1	0.07	19.2	21.2	1.11	354.0	354,8	17.91	12.2	11.1	0.39
IV	3.3	3.2	0.10	21.6	21.2	1.55	352.6	369,4	21.86	12.3	12.8	1.16
Total	3.2	3.1	0.05	20.4	20.5	0.65	342.9	343.0	6.28	12.4	12.2	0.66

Table 2. Results from comparison between the two treatments for pregnancy percent

Treatment	Heifer total	Pregnancy total	Percent pregnancy	Significant
Uterus insemination treatment	20	7	35	P < 0.05
Deep intracornual insemination treatment	20	14	70	