Embryo Quality Characteristics from Superovulated Cows treatment with Nutrition Horizons Nutrition Factor Immune Product (NHNFI)

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Summary

We evaluated whether treatment with Nutrition Horizons Nutrition Factor Immune Product (NHNFI) would have an effect on quality, stage, and fertilization rate of embryos recovered from embryo donor cows. Cows were superovulated using follicle stimulating hormone as NIH-FSH-P1 and were stratified by breed before random assignment to treatment: 1) donors received six boluses containing Nutrition Horizons Nutrition Factor Immune product (NHNFI; n = 35); or 2) donors received six placebo boluses containing wheat middlings (Control; n = 37). All donors were exposed to the same superovulation protocol, initiated by insertion of a CIDR on d 0, eight injections of FSH administered at 12 h intervals initiated on d 4, plus two injections of PGF 12 h apart on d 7. At 0 (a single unit of semen) and 12 (two units of semen) h after detected estrus cows received an AI. Boluses were inserted into the esophagus utilizing a balling gun. Cows received two boluses during each of three days: at CIDR insertion (d 0), at the first (d 4), and third (d 5) injection of FSH. Embryos were collected 7 d after first detected estrus and were recovered by a single embryo technician using a nonsurgical embryo collection procedure. The embryos were evaluated under a stereomicroscope and classified by stage and quality. Total ova and transferable ova per flush for NHNFI and Control, respectively, did not differ. Mean grade 1 and 2, stage 4, 5, or 6 were similar among treatments. In addition, no differences existed between treatments for degenerated or unfertilized embryos. However, the percentage of grade 1 embryos collected compared to recovered transferable embryos tended ($P = 0.062$) to be greater for NHNFI (39.4%) than Controls (23.4%). In addition, the percentage of grade 2 embryos collected compared to recovered transferable embryos was greater ($P < 0.05$) for Control (76.6%) than NHNFI (59.9%). We can conclude that the number of transferable embryos collected per flush did not differ between treatments; however, the quality of transferable embryos was improved after embryo donor cows received NHNFI prior to embryo collection.

Materials and Methods

Animals and Superovulation

Seventy-two embryo donor cows located in Marianna, FL, were submitted to a superovulation protocol. On d 0 cows received a 2 mL combo injection containing estradiol + progesterone and CIDR insert containing 1.38 g of progesterone (Pfizer Animal Health, New York, NY). On d 4 cows were stimulated with eight decreasing

doses of follicle stimulating hormone as NIH-FSH-P1 (Folltropin®-V, Bioniche Animal Health USA, Inc. Athens, GA) administered twice daily 12 h apart during 4 consecutive days. Prostaglandin ($PGF_{2\alpha}$, 25 mg, Lutalyse Pfizer Animal Health, New York, NY), was administered 12 h apart on d 7 of the protocol. Cows were inseminated with a single unit of semen at first observed estrus, followed by AI with two units of semen 12 h later. All semen used in this experiment was collected and frozen by a Certified Service Company using North American Association of Animal Breeders guidelines.

Treatments

Rumen boluses capsules were prepared with: 1) Nutrition Horizons Nutrition Factor Immune product (NHNFI); or 2) placebo boluses containing wheat middlings (Control). Boluses were inserted into the esophagus of each cow utilizing a balling gun. Cows received two boluses during each of three days: at CIDR insertion (d 0), at the first (d 4), and at the third (d 5) injection of FSH. After cows were stratified by breed they were assigned to receive NHNFI (n = 35) or Control (n = 37) boluses. Two donors in the NHNFI treatment failed to respond to superstimulation and were eliminated from the analyses.

Embryos were collected 7 days after first detected estrus and were recovered by a single embryo technician using a nonsurgical embryo collection procedure and were evaluated under a stereomicroscope. The technician and embryologist were blind to treatments. Embryos were assigned a developmental stage and quality grade according to standards set forth by the International Embryo Transfer Society (Savoy, IL). Developmental stage codes were: 4 = morula; 5 = early blastocyst; 6 = blastocyst; and 7 = expanded blastocyst. Quality codes were: 1 = symmetrical and spherical embryo mass with individual blastomeres that were uniform in size, color, and density with at least 85% of the cellular material intact (excellent or good); 2 = moderate irregularities in overall shape of embryonic mass or in size, color and density of individual cells with at least 50% of the cellular material intact (fair); 4 = dead or degenerating; and 5 = unfertilized.

Results

Table 1 summarizes superovulation and embryo quality characteristics. Total ova and transferable ova per flush for NHNFI and Control did not differ and mean grade 1 and 2, stage 4, 5, or 6 were similar among treatments. In addition, no differences existed between treatments for degenerated or unfertilized embryos. However, the percentage of grade 1 embryos collected compared to recovered transferable embryos tended ($P = 0.062$) to be greater for NHNFI (39.4%) than Controls (23.4%). In addition, the percentage of grade 2 embryos collected compared to recovered transferable embryos was greater ($P < 0.05$) for Control (76.6%) than NHNFI (59.9%). Therefore, it appears that since Controls appear to have a greater percentage of grade 2 embryos than NHNFI treated cows, treatment with NHNFI may increase the percentage of higher quality grade 1 embryos compared to controls.

Conclusion

We can conclude that the number of transferable embryos collected per flush did not differ between treatments; however, the quality of transferable embryos was improved after embryo donor cows received NHNFI prior to embryo collection.

Table 1.

	Treatment			
	NHNFI	Control	SEM	Pr. > F
No. of donors				
Total embryos/ova, no.	15.0	12.4	1.795	0.295
Transferable embryos, no	5.2	4.5	1.087	0.635
Grade 1 embryos, no.	2.8	1.7	0.796	0.336
Grade 2 embryos, no.	2.5	2.8	0.469	0.579
Unfertilized ova, no.	7.9	6.1	1.402	0.348
Degenerate embryos, no.	1.8	1.8	0.410	0.903
Transferable embryos, %	38.0	40.2	5.381	0.772
Grade 1 transferable embryos, %	39.4[v]	23.4[w]	6.377	0.062
Grade 2 transferable embryos, %	59.9[x]	76.6[y]	6.335	0.049
Unfertilized ova, %	47.4	47.0	6.175	0.958
Degenerate embryos, %	14.6	12.9	2.963	0.676

[vw]Percentages tend to differ (P = 0.062).

[xy]Percentages differ (P < 0.05) .