Kansas Agricultural Experiment Station Research Reports

Volume 1
Issue 1 *Cattlemen's Day*

Article 6

January 2015

Value and Use of Artificial Insemination by Beef Producers

S. K. Johnson
Kansas State University, sandyj@ksu.edu

Garland R. Dahlke
Iowa State University, garland@iastate.edu

Recommended Citation

Johnson, S. K. and Dahlke, Garland R. (2015) "Value and Use of Artificial Insemination by Beef Producers," *Kansas Agricultural Experiment Station Research Reports*: Vol. 1: Iss. 1. https://doi.org/10.4148/2378-5977.1020

Value and Use of Artificial Insemination by Beef Producers

Abstract
Artificial insemination and estrous synchronization remain underutilized by U.S. beef producers. The most recent National Animal Health Monitoring Survey (NAHMS 2007–08) reported that 7.6% of producers used artificial insemination and 7.9% used estrous synchronization. The most common reason cited for not using these reproductive technologies was time and labor, followed by cost and difficulty. Little information is available on actual management practices used by producers who do use these technologies and their value to such operations.

Keywords
artificial insemination, estrous synchronization, calf value

K-STATE Research and Extension

CATTLEMEN'S DAY 2015

Value and Use of Artificial Insemination by Beef Producers

S.K. Johnson and G. Dahlke[1]

Introduction

Artificial insemination and estrous synchronization remain underutilized by U.S. beef producers. The most recent National Animal Health Monitoring Survey (NAHMS 2007–08) reported that 7.6% of producers used artificial insemination and 7.9% used estrous synchronization. The most common reason cited for not using these reproductive technologies was time and labor, followed by cost and difficulty. Little information is available on actual management practices used by producers who do use these technologies and their value to such operations.

Experimental Procedures

An online survey was developed to assess a variety of production practices, synchronization methods, and available tools used with artificial insemination and estrous synchronization. The survey tool was pretested on a subset of producers and extension professionals and refined according to that input.

A link to the online survey was sent to e-mail addresses of those who registered with the Iowa Beef Center when they downloaded software used to plan artificial insemination programs (Estrus Synchronization Planner). In addition, a link to the survey was promoted through electronic extension publications, contact lists, and cooperating news media.

Logistic regression was used to determine differences in practices based on involvement in the industry (commercial cow-calf, seedstock, commercial heifer development, veterinarian, artificial insemination technician, other). Because of small numbers in some categories and allowance for multiple areas of activity, a new group defined as Multiple was created for responses with any combination of two or more areas of industry involvement. Responses for Multiple, Commercial, or Seedstock industry groups used for analysis numbered 164, 90, and 136, respectively.

Results and Discussion

The survey was accessed by 546 individuals, and 425 completed the survey. Responses came from 42 states; Kansas led in responses with 10%, followed by Iowa at 7%. When asked to describe all areas of involvement in the cattle industry, respondents repre-

[1] Iowa State University.

sented commercial cow-calf herds (56%), seedstock herds (67%), commercial heifer development (14%), artificial insemination technicians (18%), veterinarians (18%), and other (11%; club calf most common listed). The importance of cattle sales to income and number of females inseminated are shown in Table 1.

The value of calves sired by artificial insemination compared with natural service–sired calves on a per-head basis was the highest for Seedstock producers ($709), followed by Multiple ($389) and Commercial ($187); however, marketing endpoint was not necessarily the same. The average semen cost (Table 2) used by these groups reflected the value of calves sired by artificial insemination and was highest for the Seedstock group and did not differ between Commercial and Multiple groups. Commercial producers reported fewer years of artificial insemination experience than Seedstock or Multiple producers.

The value of replacements and reducing calving difficulty were the most common factors cited as contributing to the profitability of artificial insemination, and frequency was not affected by industry subgroup or number of cows inseminated (Table 3). For Seedstock and Multiple, the odds of raising bulls for others as a source of profitability was 8.2 to 10 times, respectively, as large as for Commercial producers. Commercial producers were just as likely to raise bulls for themselves as were Seedstock producers, whereas the odds were 2.8 times greater for Multiple compared with Commercial producers to raise bulls for themselves. Seedstock producers were less likely than Commercial producers to indicate that a premium at weaning contributed to the profitability of calves sired by artificial insemination.

A majority of producers used artificial insemination for both cows and heifers (87%), with 8% using it on heifers only and 5% on cows only. Frequency of use of estrus synchronization was always (46%), usually (26%), sometimes (28%), rarely (6%), or never (4%). Proportions in each of the use categories were similar for cows and heifers. Those who responded that they always used estrous synchronization inseminated more owned cows and heifers (Table 4) than those who used it less often.

Insemination after observed estrus was the most common method of insemination, followed by single fixed-time artificial insemination, then artificial insemination after observed estrus with cleanup timed artificial insemination (42%, 34%, and 24%, respectively). Industry subgroup did not influence the proportion of each insemination method used. The frequency of use did not differ between cows and heifers; rather, they were most likely to use the same method on both age groups. The average number of owned cows inseminated when cows were bred with insemination after observed estrus or single fixed-time artificial insemination was similar, but if a combination was used, the average number of owned cows inseminated was higher (51, 75, and 105, respectively). A similar pattern was apparent in the number of owned heifers inseminated after observed estrus, single fixed-time artificial insemination, or the combination (26, 26, and 45, respectively).

The most frequently used system for synchronization of estrus in both cows and heifers was a 7-day CO-Synch + CIDR protocol (Table 5). This was the preferred system for

53% of those synchronizing cows. Although it was the most commonly reported system used in heifers, only 33% reported using it.

Implications

The value of calves sired by artificial insemination compared with natural service–sired calves was greater for Seedstock producers than Commercial producers, but marketing endpoint was not necessarily the same. Commercial producers still reported an added value of $187/head for calves sired by artificial insemination.

The value of replacements and reducing calving difficulty were the most common factors contributing to the profitability of artificial insemination.

Table 1. Cattle sales as a proportion of income and numbers of females inseminated

Income	n	%	No. owned heifers artificially inseminated	No. owned cows artificially inseminated
<30% of income from cattle sales	185	45	12 ± 7[a]	28 ± 11[a]
30–50% of income from cattle sales	98	22	29 ± 9[b]	61 ± 14[b]
50–80% of income from cattle sales	75	18	50 ± 11[b]	93 ± 18[c]
>90% of income from cattle sales	44	11	100 ± 14[c]	157 ± 22[c]
Do not own cattle	6	1.5		

[a,b,c] Means within column differ, $P < 0.01$.

Table 2. Effect of cattle industry involvement[1] on value of calves sired by artificial insemination, semen cost, and years of artificial insemination experience.

Subgroup[2]	n	Value of calves sired by artificial insemination[3]	Semen cost ($/straw)	Years of artificial insemination experience
Commercial	72	187 ± 79[x]	22.2 ± 1.6[x]	11.4 ± 1.3[x]
Seedstock	115	709 ± 63[y]	29.7 ± 1.3[y]	16.9 ± 1.0[y]
Multiple	135	398 ± 58[z]	25.6 ± 1.2[x]	15.4 ± 0.9[y]

[1] Involvement in the cattle industry: Commercial cow-calf producer, seedstock producer, commercial heifer development, artificial insemination technician, veterinarian, or other; more than one response was allowed.
[2] Only Commercial, only Seedstock, or Multiple (any combination of areas of involvement in the cattle industry including Seedstock and Commercial).
[3] Increase in value of calves sired by artificial insemination compared to calves sired by natural service, $/head.
[x,y,z] Means within a column differ $P < 0.05$.

Table 3. Frequency of factors cited as contributing to the profitability of artificial insemination

Industry subgroup[1]	Value of replacements	Reduce calving difficulty	Raising bulls for others	Raising bulls for self	Premium at weaning	Premium for carcass
Commercial, % (n)	73 (66)	56 (50)	9 (8)	27 (24)	46 (41)	26 (23)
Multiple, % (n)	85 (139)	58 (95)	52 (86)	51 (83)	54 (89)	38 (63)
Seedstock, % (n)	79 (107)	50 (68)	51 (70)	30 (41)	38 (51)	21 (29)
Total, % (n)	80 (312)	55 (213)	42 (164)	38 (148)	46 (181)	29 (115)
Subgroup, *P*-value	0.3532	0.6304	0.0001	0.0002	0.0105	0.0331
No. of cows inseminated, *P*-value	0.2702	0.4328	0.5670	0.1914	0.6596	0.0025
Reference–Commercial						
Multiple	-	-	10.0* (4.5, 22.2)	2.8* (1.5, 5.1)	1.0 (0.6, 1.8)	1.4 (0.8, 2.7)
Seedstock	-	-	8.2* (3.6, 18.4)	1.1 (0.6, 2.2)	0.5* (0.3, 0.9)	0.7 (0.4, 1.4)

[1] Only commercial, only seedstock, or multiple (any combination of areas of involvement in the cattle industry including seedstock and commercial).
* Odds ratio and 95% CI; value significant, $P < 0.05$.

Table 4. Likelihood of use of estrous synchronization

Synchronize estrus?[1]	Heifers, %[2]	No. owned heifers artificially inseminated	Cows, %[2]	No. owned cows artificially inseminated
Always	48	66 ± 13[a]	44	128 ± 13[a]
Usually	27	30 ± 10[b]	24	55 ± 16[b]
Sometimes[3]	16		20	
Rarely[3]	6	20 ± 15[b]	7	72 ± 15[b]
Never[3]	3		6	

[1] Chi-square cows vs. heifers, $P = 0.0764$.
[2] N = 489 heifers and 428 cows.
[3] Categories grouped for analysis.
[a,b] Means within column differ, $P > 0.01$.

Table 5. Preferred systems for synchronization of estrus

Heifers			Cows		
System	n	%	System	n	%
7-day CO-Synch + CIDR[1]	147	33	7-day CO-Synch + CIDR	211	53
7-day CIDR	68	15	Select Synch + CIDR	66	17
1 shot PG[2]	59	13	1-shot PG	36	9
14-day CIDR-PG	53	12			
MGA-PG[3]	33	7			

[1] Controlled internal drug release.
[2] Prostaglandin.
[3] Melengesterol acetate-prostaglandin.