

Comparing Standing Heat and Estroprotect Heat Detection Patches

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Introduction

A recent survey showed that 66% of producers surveyed used some amount of heat detection in their artificial insemination program, and 74% of producers that used heat detection aids had tried Estroprotect (Rockway, Inc.; Spring Valley, WS) heat detection patches. The peel-and-stick application made Estroprotect more popular than types that required adhesive application. The patches are designed so that when the animal is mounted the top surface layer is removed, much like scratching a lottery ticket. After several mounts the entire layer is removed, leaving a bright-colored surface behind. A new type of patch, Standing Heat (Standing Heat, LLC; Dannebrog, NE), was recently released and has a surface layer designed to rub off with the goal of reducing false positive readings due to inadvertent scratches such as from branches or tail switching. The objective of the current study was to compare the efficacy of two different heat detection patches.

Experimental Procedures

Angus and Angus cross yearling heifers at two locations ($n = 118$ location 1; $n = 87$ location 2) had estrus synchronized for fixed-time artificial insemination. At the time prostaglandin was administered, each heifer received one Estroprotect and one Standing Heat patch, alternating the patch with the forward placement on every other heifer. At the time of insemination, patches were scored as 0 = unchanged, 1 = color change on less than half of the surface, 2 = color change on more than half of the surface, and 3 = patch missing. Patches were applied according to manufacturer's directions. At the time the patches were applied at location 1, weather conditions were relatively warm for April (mid 70s) with a high wind (20 to 30 mph). Heifers had winter hair coats, and the wind had dusted them with their ground hay-based diet. Heifers at location 2 had shed out by the time patches were applied in June, and weather was pleasant and dry. Pregnancy rate to artificial insemination was determined 35 to 97 days postinsemination. For purposes of analysis, Estroprotect patch scores were used as the reference, to which the Standing Heat patches were compared.

Results and Discussion

At the time of artificial insemination, more ($P < 0.01$) Standing Heat devices were missing than Estroprotect, 60 (29%) vs. 6 (3%), respectively. Retention of patches was greater ($P < 0.01$) for location 1 (74%) than for location 2 (60%). Extra time was spent

applying patches at location 2 because of the loss noted at location 1. No inferences can be made about length of retention when estrus is not synchronized and patches must remain in place for a longer duration.

When Standing Heat patches were missing, five heifers also were missing Estroprotect patches, 48 patches scored 2, and 7 patches scored 1 (12%). Heifers were not observed for retention of patches between the prostaglandin injection and timed artificial insemination. Some of these patches may still have been in place had they been used in a typical heat detection setting. When Estroprotect patches were missing, five heifers also were missing Standing Heat patches and one had a patch score of 2. Because all heifers that lost Estroprotect patches ($n = 6$) conceived to artificial insemination, it is probable that estrous activity was responsible for the patch loss. Retention was not influenced by relative position on the heifer (which patch was in front and which behind).

Data and test performance are shown in Table 1. Sensitivity (true positive, in heat) was 82%, and specificity (true negative, no sign of heat) was 71%. The two systems were compared using a Kappa coefficient, which is a statistical measure of relatedness between the two measurement systems. A Kappa score of 1 indicates perfect agreement, whereas scores less than 1 indicate less than perfect agreement between the measurement systems. In this study, the Kappa score was 0.68, indicating good agreement between the two systems. With 103 of 113 heifers showing positive signs of estrus, the positive predictive value (probability a heifer with a score of 2 or 3 was in heat) was 91% (95% confidence interval ranged from 84.3 to 95.7%). The negative predictive value (probability a heifer with no color change was not in heat) was 76.3% (confidence interval of 66.4 to 84.5%).

Pregnancy rate by patch score for both devices is shown in Table 2. Pregnancy rate increased ($P < 0.01$) as the patch score increased from 0 to 3, indicating higher fixed-timed artificial insemination pregnancy rates in heifers that have shown heat prior to insemination. However, the 41% of heifers that were pregnant to artificial insemination despite having an unactivated patch is an indication of how well the synchronization systems did in synchronizing ovulation, rather than a reflection on the patches as heat-detection aids.

Implications

Length of retention of Estroprotect patches was longer than Standing Heat patches under the conditions of this study. When missing patches are interpreted to indicate heifers had shown heat, agreement between the two systems was good.

Table 1. Summary of results comparing Standing Heat¹ patches to Estroject² patches as the reference in beef heifers at fixed-timed artificial insemination

	Estroject status	
	In heat (score 2 or 3) ³	Not in heat (score 0 or 1) ³
Test positive	103 (true positive)	10 (false positive)
Test negative	22 (false negative)	71 (true negative)
Sensitivity (95% CI) ⁴	82.4 (74.6-88.6)	
Specificity (95% CI) ⁴	87.7 (78.5-93.9)	

¹ Standing Heat, LLC, Dannebrog, NE.

² Rockway, Inc., Spring Valley, WS.

³ At the time of insemination, patches were scored as 0 = unchanged, 1 = color change on less than half of the surface, 2 = color change on more than half of the surface and 3 = patch missing.

⁴ 95% confidence interval.

Table 2. Pregnancy rate to artificial insemination by patch score for Standing Heat¹ and Estroject² heat detection devices

Device	Patch score (number and percentage)			
	Not in heat		In heat	
	0	1	2	3
Estroject	10/26 (38)	31/54 (57)	84/119 (71)	6/6 (100)
subtotals	41/80 (51)		90/125 (72)	
Standing Heat	12/28 (43)	38/65 (58)	33/52 (63)	48/60 (80)
subtotals	50/93 (54)		81/112 (72)	
Total	22/54 (41)	69/119 (58)	117/171 (68)	54/66 (82)

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² Rockway, Inc., Spring Valley, WS.