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Benchmarking Reproductive Efficiency and Transition Cow Health of Kansas Dairy Herds

A. Scanavez
Kansas State University, Manhattan, scanavez@k-state.edu

B. E. Voelz
Kansas State University, Manhattan, bvoelz@k-state.edu

L. Mendonca
Kansas State University, Manhattan, mendonca@k-state.edu

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Abstract

Comparing key performance indicators across dairy farms may provide insightful information to dairy producers. Differences in management philosophies, facilities, and locations of dairy farms may influence overall performance of dairy operations. An ongoing extension program aims to benchmark reproductive performance and transition cow health of dairy farms located in Kansas and adjacent states. In this report, we compiled data from 2013 to 2015 of herds enrolled in the program and divided the data in warm and cool seasons to evaluate the impact of heat stress on key performance indicators. Annual pregnancy risk and warm to cool ratio of pregnancy risk varied from 20.9 to 22.5% and 75 to 82%, respectively. Annual insemination risk varied from 63.6 to 66.4% and warm to cool ratio of insemination risk varied from 96 to 97%, which suggests that heat stress does not remarkably affect insemination risk. In contrast, conception risk is significantly affected by heat stress because conception risk in the warm season ranged from 26.7 to 29.6% and in the cool season from 34.5 to 35.4% from 2013 to 2015. Percentage of cows that were treated for mastitis within 21 d after calving was below 4% annually. Warm to cool ratio of percentage of cows treated for mastitis ranged from 139 to 170%, indicating that during summer, cows are at increased risk of being affected by early postpartum mastitis. Benchmarking key performance indicators may assist dairy producers to identify areas of opportunity for improvement.

Keywords

dairy cattle, benchmarking, reproductive efficiency, cow health

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Summary

Comparing key performance indicators across dairy farms may provide insightful information to dairy producers. Differences in management philosophies, facilities, and locations of dairy farms may influence overall performance of dairy operations. An ongoing extension program aims to benchmark reproductive performance and transition cow health of dairy farms located in Kansas and adjacent states. In this report, we compiled data from 2013 to 2015 of herds enrolled in the program and divided the data in warm and cool seasons to evaluate the impact of heat stress on key performance indicators. Annual pregnancy risk and warm to cool ratio of pregnancy risk varied from 20.9 to 22.5% and 75 to 82%, respectively. Annual insemination risk varied from 63.6 to 66.4% and warm to cool ratio of insemination risk varied from 96 to 97%, which suggests that heat stress does not remarkably affect insemination risk. In contrast, conception risk is significantly affected by heat stress because conception risk in the warm season ranged from 26.7 to 29.6% and in the cool season from 34.5 to 35.4% from 2013 to 2015. Percentage of cows that were treated for mastitis within 21 d after calving was below 4% annually. Warm to cool ratio of percentage of cows treated for mastitis ranged from 139 to 170%, indicating that during summer, cows are at increased risk of being affected by early postpartum mastitis. Benchmarking key performance indicators may assist dairy producers to identify areas of opportunity for improvement.

Key words: dairy cattle, benchmarking, reproductive efficiency, cow health

Introduction

Herd reproductive efficiency influences profitability of dairy operations. Reproductive performance of dairy herds may be associated with several factors such as management strategies and facilities. Additionally, recent research has demonstrated that transition cow health greatly affects reproductive performance of dairy cows. Hence, reproduction and transition cow health are priority areas to be monitored closely in dairy farms because of their importance in efficiency and profitability.

Benchmarking reproductive performance and transition cow health of dairy herds may be useful to monitor and identify improvement opportunities in dairy operations. Considering that several factors may impact reproductive efficiency and transition cow

health, comparing records across dairy farms may provide further understanding of results being achieved. Benchmarking these areas may reveal consequences of chosen management practices and impacts of facilities on key performance indicators (KPI). Staff from K-State Research and Extension developed a program to benchmark overall performance records of dairy herds on a monthly basis. The purpose of this ongoing extension program is to compare KPIs related to production, reproduction, and transition cow health of herds located in Kansas. Currently, the Dairy Records Intelligence Network (DRINK) program benchmarks 25 herds, which are located in Kansas and adjacent states and account for approximately 77,000 lactating cows. This article focuses on reproductive performance and transition cow health of participating herds in the DRINK program.

Experimental Procedures

Reproductive performance and transition cow health data were extracted from on-farm management software from herds enrolled in the DRINK program. Data pertain to 2013 - 2015. All traits were extracted at the herd level to compare monthly averages.

Reproductive performance

Pregnancy and insemination risk calculated in 21-d cycles were extracted. Pregnancy risk represented the percentage of cows that became pregnant of all cows that were eligible to become pregnant in the cycle. Insemination risk represented the proportion of cows inseminated of cows eligible to be inseminated during the cycle. Cycles were adjusted for the voluntary waiting period of the herds to calculate actual pregnancy and insemination risk. Pregnancy and insemination risk data extracted from the herds were compiled to monthly averages. Each 21-d cycle was assigned to the month in which at least 50% of the days of the cycle were within the specific month. An average of pregnancy risk was calculated for the months that had 2 cycles. Conception risk was categorized on a monthly basis and represented the percentage of cows that became pregnant among cows that were inseminated.

Transition cow health

Traits to evaluate transition cow health data were categorized on a monthly basis. Stillbirth represented the percentage of calves born dead or dead within the first 24 h after calving. Mastitis postpartum represented the percentage of cows treated for mastitis within 21 d after calving.

Months were categorized by season and averages for each season were calculated. June to August was categorized as warm season, and January to May and September to December were categorized as cool season. Data were analyzed by ANOVA for repeated measures using the MIXED procedure of SAS, or by ANOVA using the GLM procedure of SAS.

Results and Discussion

Annual pregnancy risk ranged from 20.9 to 22.5% from 2013 to 2015 (Table 1). Although annual pregnancy risk is valuable information to evaluate the end result of the reproductive program of a herd, it is more important to observe the variation across the year. For the majority of the months, average pregnancy risk is $\geq$ 21% (Table 1),

however, during July and August reproductive efficiency is significantly decreased. This indicates that producers should mainly focus on achieving a pregnancy risk $\geq$ 21% during summer months. Considering that most producers desire to have a high annual pregnancy risk (e.g., 30%), the key is to emphasize improving reproductive efficiency during summer months.

Insemination risk does not vary significantly across the year (Table 1). The warm to cool ratio of insemination risk ranges from 96 to 97%, indicating that the current reproductive management practices that are in place overcome the negative effects of heat stress on estrus expression. The majority of the herds enrolled in the program use a combination of estrus detection programs with timed AI protocols. Estrus detection for most of the herds consists of observing tail paint removal once daily. Despite the fact that insemination risk is not affected during summer, conception risk is greatly affected during the warm season (Table 3). The range of warm to cool ratio of conception risk is 75 to 86% from 2013 to 2015. This indicates that poor conception risk during the summer is the main reason for low reproductive efficiency from June to August.

Annual average risk of mastitis postpartum is below 4% (Table 2). Because cows that have mastitis early postpartum have decreased reproductive performance and milk yield during lactation, it is key to monitor this indicator closely. Regardless of the year observed, mastitis postpartum during summer months is consistently > 4% (Table 2). The warm to cool ratio of mastitis postpartum ranges from 139 to 170%. The remarkable increase in percentage of cows treated for mastitis during the summer may be attributed to increased rainfall and heat stress. Postpartum cows are susceptible to health disorders because periparturient cows have decreased immune function. Thus, implementation of cooling strategies for transition cows may minimize heat stress, which may improve transition cow health. Herd-level stillbirth percentage is not negatively affected by summer. Annual stillbirth percentage varied from 4.8 to 6.0%. Herds should strive to maintain stillbirth incidence < 5% in part because it impacts the dam's survival and reproductive performance.

In conclusion, dairy producers located in Kansas that want to achieve greater annual pregnancy risk should focus on improving conception risk during the summer months. Because insemination risk is not impacted during summer, dairy producers should strive to maintain an efficient estrus detection programs independently of the season. Percentage of cows treated for mastitis is greatly increased during the summer. Benchmarking dairy herds may assist producers in identifying areas of opportunity. Lastly, maintaining accurate records of uterine diseases, mastitis, lameness, and metabolic disorders are necessary to identify potential limitations of the transition cow program.

Acknowledgments

Table 1. Reproductive performance according to month from 2013 to 2015 of herds enrolled in the DRINK program

						Month							
Item	January	February	March	April	May	June	July	August	September	October	November	December	Annual average
Pregnancy risk, %													
2013	23.4	22.5	23.1	21.2	21.6	19.2	17.1	17.4	19.1	20.1	23.1	22.6	20.9
2014	23.7	22.9	21.9	22.1	22.4	19.6	16.5	17.4	19.6	23.2	24.3	24.6	21.5
2015	24.6	24.3	24.6	23.6	22.9	19.6	16.7	17.9	20.4	24.2	26.4	24.4	22.5
Insemination risk, %													
2013	64.1	64.4	63.6	63.9	64.8	63.4	59.2	64.0	62.2	65.0	65.6	62.9	63.6
2014	64.1	62.1	62.8	62.8	63.6	62.7	60.2	62.9	65.6	67.1	66.4	66.5	63.9
2015	66.7	64.8	66.4	65.2	65.8	62.7	63.7	66.7	69.6	67.7	69.2	68.0	66.4
Conception risk, %													
2013	36.4	33.7	36.1	36.1	32.3	31.8	29.0	28.1	30.5	31.7	36.8	36.6	33.3
2014	38.3	36.2	36.1	35.4	35.6	30.4	27.7	28.1	29.9	35.7	35.3	36.7	33.8
2015	36.4	37.1	35.6	36.1	33.5	29.9	24.4	25.9	29.6	34.5	37.1	38.7	33.2

Table 2. Transition cow health according to month from 2013 to 2015 of herds enrolled in the DRINK program

Item	January	February	March	April	May	June	July	August	September.	October	November	December	Annual average
Stillbirth, %													
2013	6.7	8.5	6.7	6.0	5.7	4.6	5.3	6.0	5.7	5.3	6.5	5.0	6.0
2014	5.6	6.4	5.4	4.7	5.4	4.9	5.8	5.1	4.9	4.8	4.6	5.5	5.3
2015	5.9	5.4	5.6	4.4	5.1	4.8	4.4	4.4	4.0	4.7	4.3	5.1	4.8
Mastitis postpartum, %													
2013	3.6	3.2	3.2	3.0	3.2	4.6	5.1	6.6	4.8	3.1	3.6	3.0	3.9
2014	3.4	3.7	2.7	3.4	2.9	5.1	5.8	5.5	3.8	3.1	2.6	3.4	3.8
2015	3.4	3.1	2.9	2.6	4.5	4.1	4.7	4.4	3.1	2.6	2.9	3.1	3.4

Table 3. Reproductive efficiency and transition cow health from 2013 to 2015 during cool and warm seasons from herds enrolled in the DRINK program

Item	Cool season[1]	Warm season[2]	Warm to cool ratio[3]
Pregnancy risk, %			
2013	21.9	17.9	82%
2014	22.8	17.9	78%
2015	23.9	18.0	75%
Insemination risk, %			
2013	64.1	62.2	97%
2014	64.6	61.9	96%
2015	67.0	64.4	96%
Conception risk, %			
2013	34.5	29.6	86%
2014	35.4	28.7	81%
2015	35.4	26.7	75%
Stillbirth, %			
2013	6.2	5.3	86%
2014	5.3	5.3	100%
2015	4.9	4.5	92%
Mastitis postpartum, %			
2013	3.4	5.4	159%
2014	3.2	5.4	170%
2015	3.1	4.4	139%

[1] Average of traits from January to May and September to December.
[2] Averages of traits from June to August.
[3] Warm season average divided by cool season average.