The Economic Impact of Five Dairy Cattle Clinical Diseases as Measured by the Correlation between Lactational Incidence Risk and the Income Over Feed Cost in Wisconsin Dairy Herds

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Abstract #: W1

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INTRODUCTION

The objective of the study is to quantify the reduction in profit associated with dairy herd level disease. Consequently, the economic impact of the lactational incidence risk (**LIR**) of five production diseases to the income over feed cost (**IOFC**) is being established in 30 Wisconsin dairy herds. The studied diseases are: (1) milk fever (**MF**), (2) retained placenta (**RP**), (3) left displaced abomasum (**LDA**), (4) clinical ketosis (**CK**), and (5) ovarian cyst (**OC**).

The two most common diseases in dairy herds: clinical mastitis and lameness have been deeply studied (Reneau, 1986; Fourichon et al., 1999) and their economic impacts have been well established (Bar et al., 2008; Gröhn et al., 1995). However, other production diseases are also critical in the dairy industry since they constitute a major proportion of the common health problems encountered on dairy farms (Mullingan and Doherty, 2008). Table 1 depicts the incidences of MF, RP, CK and LDA reported for various studies. The incidence of OC has been reported between 6.7 and 13.1% (Lopez-Gatius et al., 2002).

Table 1. Incidence of fresh cow disorders (%) in high-producing herds[1]

Study	# herds	# cows	CK	LDA	MF	RP
Jordan, 1993	61	14,823	3.7	3.3	7.2	9
Dyk, 1995	100	2,260	12	11	8	12
Bigras-Poulin, 1990	34	2,204	3.3	NR	5.6	7.7
Scott, 1995	5	443	8.5	6.3	8.5	9
Grohn, 1995	25	8,070	4.6	6.3	1.6	7.4
Gearhart, 1990	9	561	NR	NR	9.1	10.3
Kelton, 1996	110	NR	3	2	NR	9
Crill, 1998	10	3,884	NR	1.4	3.3	11.9

[1] Compiled by W. S. Burhans, Cornell University, 1999. http://www.ansci.cornell.edu/dm/nutrition/tdn00/tdnjan00.html
[2] NR= not reported

OBJECTIVES

1. To quantify the LIR of the five studied production diseases: (1) MF, (2) RP, (3) DA, (4) CK, and (5) OC in 30 Wisconsin dairy herds
2. To quantify the IOFC in the 30 Wisconsin dairy herds under different management practices
3. To predict the impact of the LIR on the IOFC

MATERIALS AND METHODS

- Data is collected from 30 participating herds in 7 Wisconsin counties: Clark, Monroe, La Crosse, St. Croix, Manitowoc, Sheboygan and Kewaunee counties

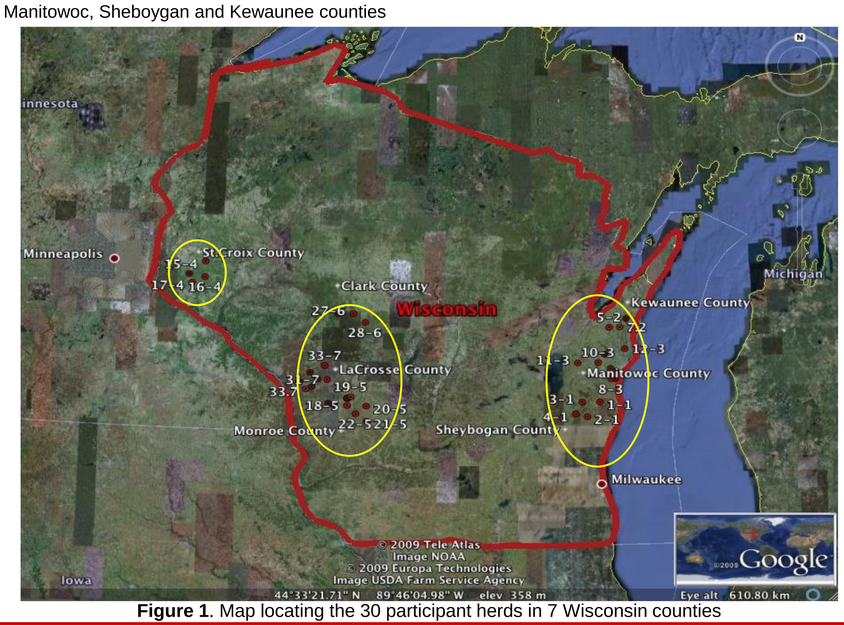

Figure 1. Map locating the 30 participant herds in 7 Wisconsin counties

MATERIALS AND METHODS

- Herds were selected with the help and support of local County Extension Agents
- Farm selection criteria: Production and financial records available and participation in a DHI record-keeping program
- Farmers were trained and provided with standardized definition of diseases (adapted from Kelton et al., 1998) to self report an event as a specific disease case
- Every farm is visited every 2 months to collect information of the LIR of the 5 diseases studied, feed costs and milk check value
- DHIA records from I-Loop (AgSource Cooperative Services, Verona, WI) are collected online through DairyCOMP 305 from each farm monthly related to milk production and number of cows by stage
- **Lactational Incidence Risk (LIR) calculation:** Disease occurrences are expressed as lactational incidence risks calculated by dividing the number of cows detected with a particular disease by the total number of cows at risk. Disease occurrences are presented as percentages.
- **Income over feed cost (IOFC) calculation:** Difference between milk income and the aggregated cost of feed ingested

$$LIR_{h,m} = (L_{a,m} / (L_{na,m} + L_{a,m}))_h$$

where
h = herd
m = month
a = affected cows
na = healthy cows
$L_{a,m}$ = number of lactations affected in month m
$L_{na,m}$ = number of lactations not affected in month m

$$IOFC_{h,m} = PM_{h,m} \times MP_{h,m} - \left(\sum_{i=1}^{n} (FC_i \times FA_i) \right)_{h,m}$$

where
h = herd
m = month
i = diet ingredient
n = number of diet ingredients
$PM_{h,m}$ = price of milk per month and herd
$MP_{h,m}$ = milk average production per month and herd
FC_i = feed cost of diet ingredient i
FA_i = feed amount of diet ingredient i

- The association between LIR of the studied diseases and the IOFC is analyzed by standard regression procedures. The IOFC is regressed against the LIR of the diseases to obtain the economic losses associated with each one of the studied diseases. An association between LIR and IOFC quantifies a loss in income due to the clinical disease.

RESULTS

- LIR ranges for CK [0-7.4%], LDA [0-3.9%], MF[0-16.7] and RP[0-21%] are between the ranges previously reported in the literature. Mean LIR of LDA, MF, and RP are also in agreement with previous reports. The LIR range for OC[0-6%] is lower than previous reports
- Large variability of the IOFC was found among farms (between 1 and 8 $/cow/d) with a mean of $3.7/cow/d
- With two months worth of data (March – April 2009) there is not yet a consistent association between the LIR and IOFC in any of the studied diseases

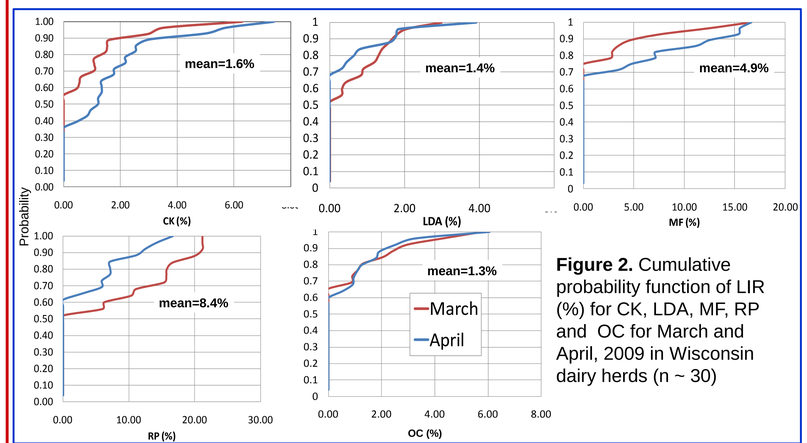

Figure 2. Cumulative probability function of LIR (%) for CK, LDA, MF, RP and OC for March and April, 2009 in Wisconsin dairy herds (n ~ 30)

RESULTS

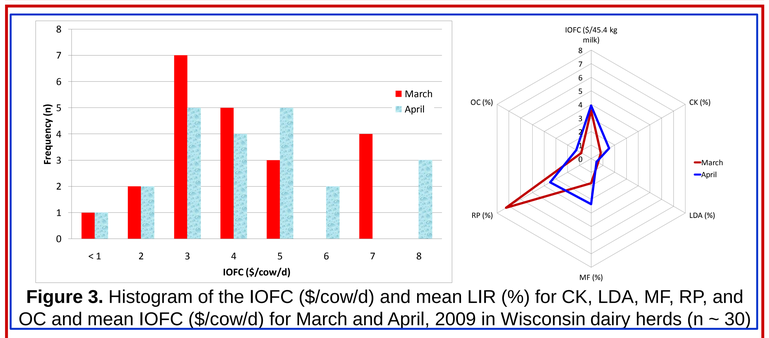

Figure 3. Histogram of the IOFC ($/cow/d) and mean LIR (%) for CK, LDA, MF, RP, and OC and mean IOFC ($/cow/d) for March and April, 2009 in Wisconsin dairy herds (n ~ 30)

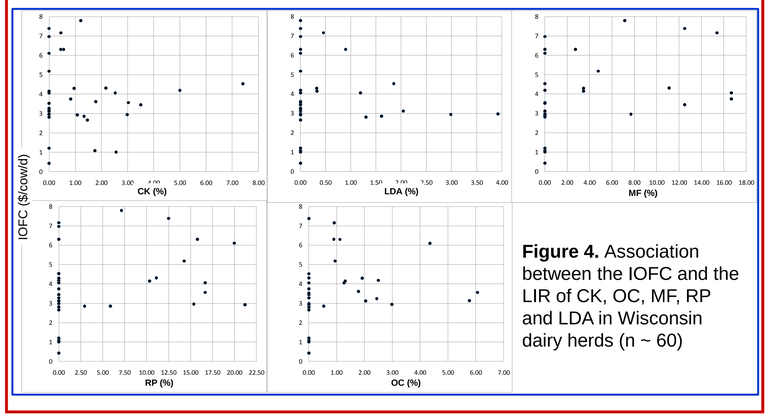

Figure 4. Association between the IOFC and the LIR of CK, OC, MF, RP and LDA in Wisconsin dairy herds (n ~ 60)

CONCLUSIONS

- Considerable variability between reported LIR in the herds may be due to geographical and managerial differences among studied herds
  - For MF and RP, the two diseases more closely associated with calving, a small number of calving events in some of the herds could explain part of this variability because of paucity of data
  - For CK differences between diagnostic techniques could explain part of the variability
  - Consistence of data will improve as more observations are collected
- Although large variability in IOFC among herds exist, the reported ranges are inside the expected local reports (e.g., UW-Center for Dairy Profitability)
  - The variation of IOFC between months for same herds was highly consistent (April was slightly higher than March)
- It is expected that associations between the diseases LIR and the herd IOFC will be evident and quantifiable as more data are collected

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