Production and Economic Effects of Johne's Disease in Dairy Cows

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Johne's disease (paratuberculosis) (JD) is a chronic progressive bacterial enteropathy. Infected animals have generally been exposed to the organism at a very young age. Clinical signs of weight loss and diarrhea are often preceded by a period of months or years during which *M. paratuberculosis* organisms are shed in feces. The effect of subclinical JD on production and economic parameters has not been well characterized.

A study of randomly selected cull dairy cows was conducted at a large plant slaughtering cull cows from throughout the northeastern U.S. Johne's positive cull cows weighed less, produced less milk during their lifetime and less milk during their last lactation than did Johne's negative cull cows.

Cull Cow Slaughter Weight

	n	wgt.	value*
Johne's neg.	350	1224 lb	$734
Johne's pos.	29	1095	657
difference		129	$77

*based on $60/cwt.

Lifetime Milk Production
Cull Cow Study

	n	lb. milk	% fat
Johne's neg.	123	55,390	3.77
Johne's pos.	6	46,753	4.15
difference		-8,637	+.38
p =		.4	.02

Milk Production, Last Lactation
Cull Cow study

	n	lb. milk	% fat
Johne's neg.	126	13,533	3.75
Johne's pos.	8	10,128	4.03
difference		-3,405	+.28
p =		.18	.06

Note: Johne's positive and negative cows did not significantly differ in breed, age at culling or stage of lactation at culling. Johne's disease in cattle is characterized by long, but variable latent period and incubation period. Possible effects on milk production and cow health during the period before clinical disease appears have not been extensively studied.
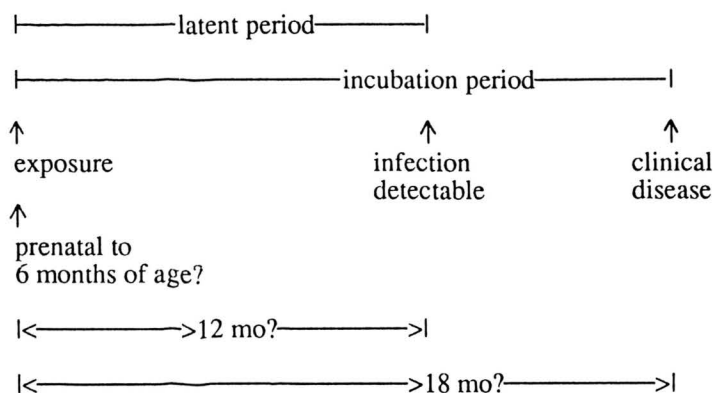
A group of twenty Pennsylvania dairy herds with 5% or greater prevalence of JD infection was selected for study. All animals in the herd were fecal-cultured at 6- or 12-month intervals. Management and production data were monitored in these herds. Thirteen of the herds were on DHIA production recording systems. All DHIA production records for cows with one or more positive fecal cultures for *M. paratuberculosis* will be compared with their culture-negative herdmates. Available somatic cell count and calving interval for culture-positive cows will be compared with culture-negative herdmates. This study is entering the final year of a planned four year study.

Production and economic data from the current study will be used to evaluate the economic consequences of Johne's disease to the dairy producer.

Preliminary, within herd, production data are available comparing JD positive and JD negative animals based on 305-day adjusted production, 305-day mature equivalent and modified contemporary deviations. At the conclusion of the study, these parameters will again be examined, along with pounds of milk/day of life, calving intervals and mean somatic cell counts.

1989 Data

11 herds
542 cows
73 JD positive cows
469 JD negative cows
Mean ME difference within herd between JD
    pos and JD neg cows -4650 lb to +1323;
    in 11 herds, JD pos cows had lower ME;
    in 2 herds JD pos had higher ME.

Among the 20 JD-infected herds on this study, 10 were randomly selected for an intensive monitoring and management program to facilitate detection and removal of positive animals and minimize the spread of *M. paratuberculosis* to young animals. Preliminary data show that in the herds on an intensive intervention program, production losses per cow were much less than when a traditional program of annual testing and removal of positive cows are followed:

Traditional Program
culture cows only
culture 1x/year
sedimentation culture method
variable management changes

Intensive Intervention
culture cows and youngstock
culture 2x/year
centrifugation culture method
management changes including:
- youngstock separation
- sanitation

ME difference between JD pos and JD neg cows
All herds--349 lb.
Intervention herds--97 lb.
traditional program herds--853 lb.

Relationship Between Starting and Ending Scrotal Circumference for Bulls in 140-Day Test-of-Gain Programs

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Scrotal circumference measurements were collected on 2,714 young bulls at the time they entered one of three bull test stations operated by the Virginia Beef Cattle Improvement Association during the years 1982-1988. Scrotal circumference measurements were collected again at the time bulls completed the 140 day test-of-gain period. Because of a 14 day adaptation period the time between measurements was 154 days. Data were also collected for breed, days of age at start of test, weight at start and end of test, and frame score at end of test. Bulls ranged from 156 days to 371 days of age at start of test with an average of 257 days. The average beginning weight was 339 kg (range 182 to 575 kg) and the average ending weight was 530 kg (range 331 to 786 kg).

Data was analyzed for the effect of beginning scrotal circumference SCs on the ending scrotal circumference SCe. Separate analyses were performed for each of 6 breeds having at least 60 bulls represented. A linear regression model with a formula $SCe = 21.65 + 0.50\,SCs$ had an R2 of 0.73. A third order polynominal regression model increased the value of R2 to only 0.75. Figure 1 is a scattergram of SCs vs SCe. Lines are drawn to indicate that young bulls entering the test stations with a scrotal circumference of less than 18 cm have a high risk of ending the test with a scrotal circumference of 30 cm or less. In these test stations bulls with a yearling scrotal circumference not exceeding 30 cm are not eligible for sale.

Multiple regression analysis showed days of age and weight off test to have influences on SCe (P .01). The estimated value for the influence of days of age was -0.017 per day and the estimated value for the influence of weight off-test was 0.019 per kg on SCe.

Breed influences for SC gain during tests were also found to be significant. SC gains during test for Angus, Hereford and Polled Hereford, Charolais, Simmental, Gelbvieh and Limousin were $8.80 + .09$, $7.35 + .21$, $9.95 + .26$, $9.49 + .20$, $9.93 + .40$, and $6.77 + .31$ respectively.

Producers of breeding bulls incur considerable expense in growing out bulls and then must sometimes cull them on the basis of low scrotal circumference. These findings will be helpful in making a decision to cull a bull with a small scrotal circumference at an early age and decrease the costs associated with rearing that bull to a greater age.

Virginia BCIA Bull Test Stations 1982-88
Scrotal Circumference Start vs End

Angus & Red Angus

$y = 23.121 + 0.45537x \quad R^2 = 0.739$

$y = -14.498 + 4.8512x - 0.16318x^2 + 1.9396e\text{-}3x^3 \quad R^2 = 0.777$

Off-test SC

Starting Scrotal Circumference