



# BCRC

BEEF CATTLE RESEARCH COUNCIL

# RESEARCH FACTS

RESEARCH & TECHNOLOGY DEVELOPMENT FOR THE CANADIAN BEEF INDUSTRY



## Trickle down benefits from the hog industry

Project Title:

Best Management Practices to Improve Environmental Sustainability and Productivity of Grassland Systems Using Hog Manure

Researchers:

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Project  
Code:

3.30

Completed:

*December  
2006*

### Background

Manitoba's annual hog production increased from less than two million head in 1980 to more than eight million in 2006. More pigs means more manure, much of which is used to fertilize croplands and forage. This project was initiated because little information was available on the impact of hog manure application on forage productivity, animal performance and the environment.

### Objective

To determine the impact of hog manure application on forage yield and quality, animal performance, greenhouse gas production and soil and water quality.

### What they did

In this three-year study, a 100 acre demonstration site next to a hog growing operation was divided into three treatment areas. No hog manure was applied to the control paddocks. Hog manure was applied only in the spring to a second set of paddocks. The same total amount of manure was applied to the third set of paddocks, with half applied in spring and the other half in fall. Each paddock was then divided in two. Cattle grazed one half of each paddock and the other half was harvested as hay. The hog manure was applied before cattle were turned out in spring, and after the cattle were removed from the pasture in fall.

### What they learned

### **Forage Yield and Quality:**

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Applying hog manure increased forage yield and forage nutrient levels as compared to the control paddocks. Dry forage yields increased by over 50% in the spring application paddocks, and more than doubled in the spring and fall application paddocks. Crude protein concentrations were highest in the paddocks that received hog manure in both the spring and fall. The proportion of Kentucky bluegrass declined, and the proportion of quackgrass increased, in paddocks that received hog manure. Other grasses (e.g. Timothy) and legumes (red clover and alfalfa) were not affected

### **Animal Performance:**

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Ten British-cross yearling steers were grazed on each paddock. The carrying capacity of the paddocks that received hog manure was more than three times higher than the carrying capacity of the control paddocks. Animal productivity increased from 100 kg gain per hectare (control) to 319 kg per hectare (spring application) and 339 kg per hectare (spring and fall application paddocks).

### **Greenhouse Gas Production:**

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Changes to soil methane emissions were negligible, but soil nitrous oxide emissions were higher for paddocks that received hog manure. However, the increased forage productivity more than compensated for the increased soil greenhouse gas emissions because the amount of carbon dioxide removed from the atmosphere and incorporated into the root mass of the forage vastly outweighed the effect of the nitrous oxide released by the soil.

Cattle methane emissions were the same for steers in both the control and manure-fertilized paddocks.

### **Soil and Water Quality:**

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Groundwater from shallow wells in each of the paddocks was measured for nitrate concentrations. Concentrations were well below critical levels and were unaffected by manure application.

More nitrogen and phosphorus was removed from the soil in paddocks that were hayed than from the paddocks that were grazed. This suggests it would be wise to monitor manure application on grazing land to prevent excessive nutrient build-up in the soil.

The hog manure contained both Salmonella and E. coli before it was applied. Both organisms were also detected on the forages shortly after manure application, but were gone (in the case of Salmonella) or greatly reduced (in the case of E. coli) 25 days after manure application. The absence of Salmonella from cattle manure on these pastures indicated that the cattle were not being contaminated because of the hog manure. The Salmonella and E. coli from the hog manure did not appear to impact the groundwater. E. coli was detected in some of the wells even before the manure was applied, and the Salmonella detected in well water was not the same subtype as the Salmonella found in the hog manure.

### **What it means**

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Fertilizing pastures and hayfields with hog manure can benefit forage production, forage quality, and animal productivity without negatively impacting the environment.

### **Proudly Funded By:**



development and adoption in support of the Canadian beef industry's vision to be recognized as a preferred supplier of healthy, high quality beef, cattle and genetics.

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