

Cheese production from Jersey milk conserves resources and reduces environmental impact

With over 40% of U.S. milk production utilized in the manufacture of cheese, using nutrient-dense milk produced by smaller Jersey cattle produces substantial reductions in water and land usage, fuel consumption, waste output, and greenhouse gas (GHG) emissions compared to using Holstein milk.

Per unit of cheese, the Jersey carbon footprint (total CO₂-equivalents) is 20% less than that of Holsteins.

These were the key findings from a life-cycle assessment study presented by Dr. Jude Capper of Washington State University on July 13 at the Joint Association Meetings of five North American scientific societies for animal agriculture, including the American Dairy Science Association and the American Society of Animal Science.

“Not only does the Jersey population conserve finite resources needed for cheese production,” Capper observed, “the total environmental impact is lower.”

Conclusions were based on a year of dairy herd performance information from nearly two million dairy cows in over 13,000 herds located in 45 states.

Capper and coauthor Dr. Roger Cady (Elanco Animal Health) broke new ground with this study by analyzing farm milk production required for the annual manufacture of 500,000 metric tons (1.1 billion pounds) of Cheddar cheese.

They compared two production systems (*Table 1, page 2*), one using the large breed Holstein cow (average mature bodyweight, 1,500 lbs.) and the other the smaller Jersey cow (1,000 lbs.). Characteristically, the Jersey produces less milk measured by volume, but containing substantially higher fat and protein content. For the manufacture of Cheddar cheese, expected yields are 12.5 lbs. cheese per hundredweight (cwt.) from Jersey milk compared to 10.1 lbs./cwt. from Holstein milk.

Capper and Cady quantified the environmental impacts of producing Cheddar cheese from these different milks. The production system model included all primary crop and milk production practices up through and including milk harvest. It did not include transportation to the manufacturing plant, production and sales systems.

They determined that to produce 500,000 metric tons of Cheddar cheese (1.1 billion pounds):

- 8.8 billion pounds of Jersey milk was needed, which was 19% less than the required amount of Holstein milk (10.9 billion pounds).
- More Jerseys (91,460 animals) were needed to produce the same amount of cheese as Holsteins.

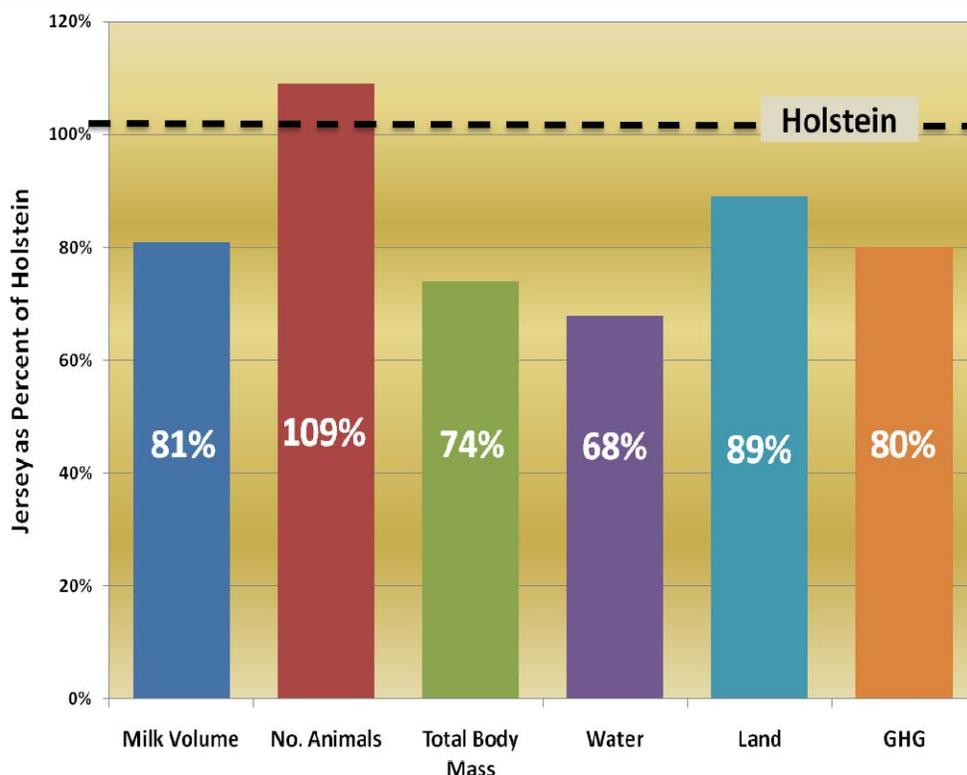


Figure 1. Use of resources and environmental impact of Jersey milk production compared to Holstein per unit of cheese produced

That represents just 0.5% of the total U.S. dairy cattle population.

- Despite the greater number of animals, the total body mass of the Jersey population was 26% smaller (276 million fewer total pounds) compared to the Holstein population.
- Total feed consumption decreased by 1.75 million tons with Jerseys, and Jerseys produced 2.5 million tons less manure compared to Holsteins.
- Water use was reduced by 32% with Jerseys, conserving 66.5 billion gallons of water, equivalent to the needs of 657,889 U.S. households.
- The land requirement dropped by 240,798 acres (376 square miles), which was 11% less than that required to support cheese production from Holsteins.
- The Jersey system used less fossil fuels than the Holstein system. The savings of 517,602 million BTUs in fossil fuel consumption is equivalent to freeing up the energy necessary to heat 6,335 U.S. homes per year.

- The 20% reduction in the carbon footprint for the Jersey system is equivalent to removing 443,900 cars from the road annually.

The study’s findings are explained by Jersey breed-specific characteristics that both reduce and dilute maintenance overhead in the production system.

The lower total body mass of the Jersey system reduces maintenance costs per animal, and the greater nutrient density of Jersey milk dilutes maintenance resource requirements, especially for water, over more units of cheese. “Water use in Jerseys comes down because there is more fat and protein in milk,” Capper noted. “The savings is not just water intake for the smaller animals, but will carry through in transport and processing the milk into cheese.

“This study demonstrates that the number of animals in a population is not a good proxy for body mass,” Capper added. “In previous work, we assumed that the number of animals in a system equaled bodyweight. More animals meant greater bodyweight and thus greater environmental impact.

“In this study, because Jerseys weigh so much less than Holsteins, even though more animals are needed to produce the same amount of cheese, the total body mass comes down,” she said. “Going forward, we need to account for differences in body size among animals.

“To produce the same amount of cheese, you need more Jersey animals,” concluded Capper.

“Holsteins do have an advantage in milk yield per animal. That is overcome by the two-fold advantage that the Jersey has. The animals weigh so much less and the milk they produce is a more nutrient-dense product.”

Major funding for this research was provided by National All-Jersey Inc., representing 1,000 producer members to promote the increased production and sale of Jersey milk and milk products.

<i>Table 1</i>	<i>Holstein</i>	<i>Jersey</i>
Daily milk yield (lb)	62	46
Fat %	3.8	4.8
Protein %	3.1	3.7
Cheese yield (lb/cwt)	10.1	12.5
Calving interval (mo)	14.1	13.7
Annual turnover %	34.5	30.0
Expected no. lactations	2.54	3.00
Age at first calving (mo)	26.1	25.3
Heifer:cow ratio	0.86	0.83
Mature cow body weight (lb)	1,500	1,000

Source: DRMS, DairyMetrics™, accessed November 9, 2009