Benchmarking: What the Top and Bottom Herds in Canada Are Doing

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Take Home Messages

- Benchmarking allows dairy farms to compare themselves to others and help set achievable objectives based on the performance of other farms
- Profitability varies from one farm to the other
- Forage cost of production should not be overlooked
- Higher production per cow is a driving factor for the cost of production
- Higher producing herds clearly achieve lower somatic cell count, comparable butterfat test, with a slightly higher protein test
- Reproduction performance is as good if not better in these herds
- Interesting challenges for the future include labour efficiency and milk composition in line with industry and consumer needs

Introduction

Dairy production is certainly a complex and challenging business as it involves numerous factors including herd management, animal health, animal care, cow comfort, forage production, financing, nutrition, genetics and marketing, to name a few. Thanks to the Canadian supply management system, the dairy sector is not as cyclic as other agricultural production systems such as swine and cereals. Even with this relative stability, some Canadian dairy farms perform extremely well, while others are struggling to survive. External events sometimes serve to exacerbate these differences. The closure of the border in 2003 is an example of an event that was even more difficult for herds at the lower end of the performance scale. It is of great interest to understand what successful farms do to assure that the end of the month is pleasant and not the stressful time experienced by some.

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Sources of Information

"Information is power" is a statement which certainly applies to the dairy business. The more you know, the better you can manage. Dairy farmers handle a lot of information each day. Dates, weights, events, counts, forage analysis, and milk components are only a sample of this. Information is very useful for day to day management at the farm. Subsequent pooling of this information generates databases which then allow a second level of analysis. Canadian dairy farmers have done an excellent job in pooling their data, creating a system where population and benchmarking values can be determined. Canadian Dairy Network (CDN), Vision2000, Agritel Web, DS@HR are good examples of organizations that have amassed dairy industry information. CDN handles information relative to genetic evaluations across Canada; Vision2000, the Canadian DHI database, looks after herd recording and production information across Canada; while Agritel Web includes information generated mainly by management clubs. Finally, DS@HR incorporates animal health and reproductive information in Quebec. Of course, benchmarking is only possible when a database exists. Large quantities of data allow us to establish relationships, and to average out and measure discrepancies between groups at the top and the bottom of the population.

The Secret of Profitable Farms

Dairy farming may be a lot of fun but profitability is a must. Profitability varies from farm to farm, even though they are working under similar market conditions: milk component prices, similar cull cow and bull calf values. Why? An extensive study carried out in Quebec in 2005 revealed some interesting differences between farms. This study, covering a four-year period, analysed the performance of a large sample (647 herds) of dairy farms in Quebec.

Farms were grouped on the basis of standardized milk profit per cow as seen in Table 1. In order to be included in a group, the herd had to have qualified for the group 3 out of the 4 years of the study. Doing this assured that no herds were included in a given group based on a single exceptional year.

Table 1. Standardized milk profit per cow as defined by Quebec management clubs

PRODUCT	
+ standardized gross price	$/hl
- standardized marketing	$/hl
= standardized net price	$/hl
x milk produced per cow	Hl/cow
= standardized product (cows only)	$/cow
CHARGES (cow related only)	
Concentrates	$/cow
Forages (standard price)	$/cow
Medication and veterinarian	$/cow
Embryos	$/cow
Insemination	$/cow
Dairy supplies	$/cow
Bedding	$/cow
Milk recording, registration, classification	$/cow
Standard total charges (cows related)	$/cow
Standard milk profit per cow	$/cow

Residual Balance was used to determine which herds fell into high or low profit herds allowing a comparison of different parameters of these two groups. Residual balance reported in this study is defined as:

Gross income

- operating costs (expenses before depreciation)
- producer's withdrawal (producer's salary to cover family cost of living)
- payment of debts (capital and interest)

Residual balance can be interpreted as the money left for the farm which can be used for development. It is the bottom line.

Over the 4-year period, the high profit farm group generated an average residual balance of $40,380 per year. This is 9.3 times the balance generated by the low profit group, confirming that a large variability exists between farms. Not surprisingly, it also confirmed the clear relationship between residual balance and milk profit per cow. Why do some farms generate more profit? Potential explanations for such large differences are herd size, debt load, work load, term on loans, production per cow, etc. All these possibilities were explored within the study and the results are presented in the following tables.

Table 2. Margin per cow and residual balance according to profit (20% strata)

Parameter	20% high profit	Average	20% low profit
Number of farms	81	647	83
Standard milk profit ($/cow)	3 635	2 996	2 188
Residual balance ($/year)	40 380	13 249	4 302
($/cow)	636	226	79

Study involving 647 dairy farms in Quebec (Agritel Web database)

Lower equity or higher debt load could possibly explain why some farms generate lower profit than others. In general, debt load increased significantly over the past few years. Shorter term on loans may be one explanation, as shorter term means that more money is devoted to servicing debt. However, table 3 shows very little difference between the two groups of farms for these parameters.

Herd size is another area which was explored because 20 cow herds clearly do not have the same potential to generate profit as 200 cow herds. The high profit group of farms did have more cows, however the 20% difference in herd size between the groups could not account for the huge difference in the profit.

Table 3. Herd size, debt load, term on loans and workload for high and low profit farms

Parameter	20% high profit	Average	20% low profit
Equity (%)	71	68	69
Average term on loans (years)	9.4	9.8	9.9
Herd size (cows)	63.5	58.5	50.8
Labour (workers, including family)	2.70	2.38	2.08
Labour (cows per worker)	23.5	24.6	24.4

(Agritel Web database)

Management clubs estimate that one worker works about 3000 hours per year (The study did not differentiate between hired or family help). One could speculate that the farms in the low profit group generate less profit due to less efficient set up, or because they devote more resources to labour. Results show that it is not the case. In fact, high profit farms employ 30% more workers. Reported on the basis of number of cows per worker, the differences are minimal. If not the debt load, herd size or the number of workers, what could explain the differences between the groups?

The results in table 4 show some clear differences. More profitable farms:

- Ship 80% more milk!!
- Generate 80% higher gross income
- Spend $49.60 to generate $100 in gross income as compared with $59.60 for low profit farms
- Generate $51,000 more in gross income per worker
- Do not spend any less money on human resources

Table 4. Milk shipped volume and value, % expenses and gross income generated per worker for high and low profit farms

Parameter	20% high profit	Average	20% low profit
Milk shipped (litres)	584 461	469 003	317 306
Gross income from milk shipped ($)	493 131	400 257	274 152
% expense (before salaries, interest and depreciation)	49.6	54.9	59.6
Gross income ($ per worker)	182 641	168 175	131 804
Milk shipped (litres per worker)	216 467	197 060	152 551
Salaries and personal withdrawals ($ per worker)	28 145	26 780	23 164

(Agritel Web database)

The results are clear: 80% more milk shipped per year with only 20% more cows, which means a much higher production per cow. High profit farms produce on average 9204 kg per cow compared with 6247 kg for the low profit farms. This represents close to 50% higher production per cow in the higher profit herds. Generally, more milk per cow means higher feed efficiency, so a lower feed cost is no surprise. Roughage dry matter intake on the basis of a full lactation does not differ greatly between a high and low producing cow. This explains why the standard forage cost per hl for the cows only (excluding replacement heifers) is significantly less for the high profit group. For the purposes of the study, forage costs were standardized to $100 per ton of dry matter, in order to reflect approximate market value. This value does not necessarily reflect the true cost of production. In fact, within the herds from the same study, management clubs established an average cost of $167 per ton of dry matter for the forages. It's easy to see that as feed costs increase, there is an impact on all herds, but the higher profit herds would be at an even greater advantage.

When evaluating concentrate costs, home grown cereals and grains fed by some farms were evaluated at the market value. Concentrates cost per 100 litres were slightly lower for the high profit group. This resulted in an even

greater reduction in the overall feed cost for high profit group. A popular paradigm is that higher production per cow will drive concentrate costs upward. This study revealed that it is not the case. Concentrate cost per cow increases as they are fed a greater number of kilograms but in this particular set of farms, the milk to concentrates ratio improved with higher production. This does not necessarily apply to all farms, however under sound management systems, concentrates cost per 100 litres of milk shipped does not increase with higher production per cow.

Table 5. Production per cow and feed-related information for high and low profit farms

Parameter	20% high profit	Average	20% low profit
Production per cow (kg)	9 204	8 017	6 247
Standard cost of forage (cows only) ($/hl)	5.56	6.45	8.47
Standard cost of concentrates (cows only) ($/hl)	9.90	10.49	10.49
Standard feed cost ($/hl)	15.46	16.94	18.96
Concentrates fed (kg/cow)	3548	3260	2654
Milk to concentrates ratio (kg/kg)	2.59	2.50	2.35

(Agritel Web database)

Finally, a few more areas were explored in the study. The results demonstrate that the high profit group of farms:

- Do not get significantly more money from cattle sales (cull cows, bull calves and cow sold for production), meaning that they are not more involved in the high priced show cattle business than the low profit farms
- Do spend more raising replacement heifers
- Do calve larger heifers at an earlier age
- Do not have a better culling rate than other herds
- Do not spend more money per cow in veterinarian and medications than average farms
- Do spend a little more money per cow for breeding than average farms

Table 6. Cattle sales, culling rate, replacement heifer, veterinarian and medication, breeding information for high and low profit group of farms

Parameter	20% high profit	Average	20% low profit
Cattle sales (% gross income)	8.0	9.4	7.3
Cost of raising a heifer ($)	2 579	2 512	2 329
Calving age (month)	26	26	28
Bodyweight after 1st calving (kg)	607	584	552
Culling rate (%)	29	28	27
Veterinarian and med. cost ($/cow)	156	153	Unavailable
Breeding cost (semen & technician) ($/cow)	103	91	Unavailable

(Agritel Web database)

■ High Production Per Cow Is Profitable

Profitable farms clearly get very good production per cow. Canadian operating conditions require building forage storage structures, resulting in higher fixed costs than if cows are on pasture year round. Cost per stall divided over more milk per cow should logically lead to lower cost of production and consequently higher profitability. It is of great interest to see how higher producing herds do. Vision2000 carries complete information (production, reproduction, feed amount and feed costs) for slightly more than 3000 Holstein herds in Quebec. To evaluate this, herds were grouped based on production per cow per year. Performance for average herds as well as the top and bottom 20% were grouped in order to evaluate the differences between them.

■ Production and Milk Composition

Bottom 20% herds averaged 6564 kg per cow compared with 9886 kg for the top 20%, a difference of 50%! The butterfat test was very similar for both groups, while the protein test was slightly higher for higher production herds. Although the difference may seem minimal, with the Canadian milk payment system, an increase of 0.06% protein means $0.48 more per hectolitre (with a protein price at $8.00 per kg and a solid non-fat to fat ratio below maximum).

Somatic cell count was 309,000 cells/ml for low producing herds and 222,000 for high producing herds. Therefore high producing herds are also more likely to achieve high quality standards. Better udder health may actually be a significant factor contributing to the difference in production level.

Table 7. Production parameters for the top 20% and bottom 20% Holstein herds grouped on the basis of production per cow

Parameter	20% high production	Average	20% low production
Number of herds	623	3 112	622
Milk per cow (kg/year)	9 886	8 303	6 564
Butterfat test (%)	3.78	3.79	3.79
Butterfat production (kg/cow/year)	379	314	249
Protein test (%)	3.24	3.22	3.18
Protein production (kg/cow/year)	320	268	209
Somatic cell count (cells/ml)	222 000	260 000	309 000

(Valacta, Dec. 31, 2006)

■ Herd Demographics

High producing farms performed better in many areas. They confirmed that having more animals in the barn is compatible with higher production. In regard to replacement animals, the performance of the higher production group was markedly better than the lower group. Their 1st calf heifers calved earlier (a difference of more than 2-months). These herds calved younger animals who were 31 kg heavier than the older first calvers from the lower group. To accomplish this, these herds have superior feeding and management of their replacement animals. They achieve a bodyweight gain in excess of 700 g per day for the entire growth period, compared to 600 g per day for the bottom herds.

To achieve maximum production, a cow must reach her 3rd lactation. It is therefore easier to maximize production per animal when the herd demographics include a higher proportion of older cows. Conversely, top herds tended to have a lower age at calving and less cows in their 3rd lactation or more. One could speculate that these herds would have greater production and higher profitability if they kept their animals for at least one more lactation.

Table 8. Herd Demographics for the top 20% and bottom 20% Holstein herds grouped on the basis of production per cow

Parameter	20% high production	Average	20% low production
Number of cows per herd	55.9	50.2	43.2
Average age at calving (months)	47	49	52
Average age at 1st calving (months)	26.6	27.6	29.0
Bodyweight of cows (kg)	643	624	604
Bodyweight of 1st calf heifers (kg)	607	592	576
% of herd at 3 lactations +	38.8	40.3	42.7
Turnover rate (%)	39.9	37.6	34.9
Voluntary removal rate (%)	9.3	6.0	3.4

(Valacta, Dec. 31, 2006)

Top herds had a turnover rate of close to 40%, which is substantially higher than 34.9% reported in bottom herds. However, in top herds, the voluntary removal rate was almost 6% higher than the lower group. This means that a greater number of animals are leaving the herd for more controlled reasons. Examples of these would be sold to another farm for production purpose or removed due to low production.

■ Reproduction

Everyone knows that reproduction is a concern worldwide and not a problem specific to Canada. Evidence seems to suggest that breeding is more of a challenge when milk production per cow increases. Potential energy deficit is worse for higher producing cows because energy requirements are higher. However, it seems that physiology may have a lot to do with this.

Care should be taken before drawing conclusions. In fact, results reported in table 9 suggest that high producing animals may not be more of a challenge.

Table 9. Reproduction performance for the top 20% and bottom 20% Holstein herds grouped on the basis of production per cow

Parameter	20% high production	Average	20% low production
Calving interval (days)	419	426	436
Calving to 1st breeding (days)	89	90	94
Breeding per cow	2.01	1.94	1.78
Days open	137	144	154

(Valacta, Dec. 31, 2006)

Top producing herds had a 17 day shorter calving interval, representing almost one full heat cycle. We could speculate on the potential explanation. Herd management is not easy to qualify. However, we know that high production will only be achieved with good quality management: good quality roughages, a sound feeding program, an appropriate feeding sequence and bunk management, an up to date transition program. Could it be that good management leads to good reproduction management? The number of days in milk at the 1st breeding being lower in high producing herds would seem to support this theory.

The number of breedings per cow is not as accurate as would be the number of breedings per conception, but it is nonetheless a good indication. Top herds for production tend to have more breeding per cow (2.01 vs 1.78) supporting the idea that higher producing cows are not as easy to get in calf than lower producers, however the difference is not large.

■ Feed Costs

Valacta is active in the feed advisory sector, having information on feeding systems, feed costs, and concentrate costs for slightly more than 3000 Holstein herds in Quebec. Some of these results are reported in table 10. Top producing herds do have:

- Higher milk value per cow. This is no surprise, as milk production is higher with components similar to the lower group
- Lower Feed cost per hectolitre. Also seen in the Agritel Web study
- Lower concentrates cost per hectolitre. Also seen in the Agritel Web study
- Higher concentrates dry matter fed per cow
- Higher Feed efficiency. Feed efficiency in dairy is becoming a more popular measure for dairy farm success. It has been used in swine and broiler production for over 25 years. This is an interesting parameter, as it refers to feed digestibility. The higher the digestibility, the lower the manure output per unit of production. Feed efficiency is thus also related to feed cost
- Higher Forage milk. Forage milk indicates the level of production allowed by forages. A forage milk level of 2949 kg means that the average cow in this herd gets enough energy and protein from forages to produce 2949 kg of milk without any supplemental energy and protein.
- Decent standard milk to concentrates ratio. Old theory had it that high production is no good because you « purchase » the last kilogram of milk. In other words, the last kilogram of milk costs more than the money it brings in. This theory may move to the old wives tale category as the

higher producing herds in this analysis had a milk to concentrates ratio at least as good as the bottom herds.

Table 10. Feed-related parameters for the top 20% and bottom 20% Holstein herds grouped on the basis of production per cow

Parameter	20% high production	Average	20% low production
Milk value ($/cow/year)	6 602	5 591	4 455
Feed cost ($/hl)	14.58	15.69	17.18
Concentrates cost ($/hl)	8.60	8.83	9.08
Concentrates d.m. (kg/cow/year)	2 949	2 583	2 083
Feed efficiency (kg milk/kg d.m.)	1.28	1.15	1.04
Forage milk (kg/cow)	2 870	2 334	1 845
Std milk/concentrates ratio	2.91	2.83	2.85

(Valacta, Dec. 31, 2006)

■ Conclusions

Dairy farms have to be profitable to attract new people to the business, allow the farm to grow, and most importantly to allow the owner and his family to earn a decent living. Profitability is motivating, lowers stress levels and increases overall enjoyment of life.

Profitability varies greatly from one dairy farm to another, even though they operate under similar market conditions. Milk production per cow is critical in minimizing cost of production. Canadian dairies operate under climatic conditions requiring good housing and forage storage structures. More milk per cow minimizes the cost per unit of production. As demonstrated by both the Agritel and Vision2000 database studies, higher producing herds can and do achieve lower feed cost, better feed efficiency, lower somatic cell counts, and good reproductive performance.

■ References:

http://fgcaq.com/Agritel/, database developed by the Fédération des groupes conseils agricoles du Québec (FGCAQ).

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