Value-Added Pros and Cons: Can Producers Profit from High-CLA Milk and Dairy Products?

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Take Home Message

- Conjugated linoleic acid (CLA) is a fatty acid in milk, and there is evidence that it helps prevent cancer and has other health benefits. CLA levels can be raised by grazing, feeding vegetable oils, or feeding fish oil.
- When CLA levels are raised by feeding fish oil, the resulting dairy products do not have a fishy taste, but cheese and butter will be softer.
- Most consumers say they are willing to pay modest premiums for high-CLA dairy products, but only if they are convinced that CLA helps prevent cancer. The human studies that would be most convincing are not completed yet. Also, CLA is a trans-fat, which consumers view negatively.
- At least in the U.S., food labeling laws allow the possibility that qualified CLA health claims may someday be allowed.
- Even at modest premiums on a small production scale, processing high-CLA dairy products appears financially viable on paper, but real-world examples show that profitability is a much more complex and elusive goal.
- Developing markets for small-scale, value-added dairy products is a serious challenge. Many such entrepreneurs start from a background in milk production, and face a steep learning curve when trying to process and market dairy products.

Background

In recent years, dairy producers faced pressure from more volatile prices, long periods of low milk prices, and fierce cost competition from efficient mega-dairies. These pressures fueled the search for value-added opportunities, and with consumers increasingly turning to food for health and wellness benefits,

"functional foods" and "nutraceuticals" are growth areas. Functional foods promise health benefits above and beyond basic nutritional value. Dairy products high in naturally-occurring conjugated linoleic acid (CLA) may be a functional food with market potential. Animal studies showed that CLA inhibits several cancers, and helps replace fat with lean muscle. Average human intake of CLA is probably less than 0.5 gram/person/day, and the lab animals showed cancer-reduction benefits when consuming the human equivalent of 3.5 grams of CLA daily. So, a typical diet probably does not include enough CLA to produce substantial health benefits, but CLA in milk can be elevated to levels that may reduce the risk of cancer.

Sharon Franklin, an animal scientist, and I did a study that we hope gives potential investors useful information about the expected commercial viability of high-CLA dairy foods. The emphasis was on small scale processing ventures that might benefit from freely-available market research. This paper summarizes that study, discusses health claim labeling requirements affecting high-CLA dairy products, and summarizes some lessons learned during real-world efforts to market high-CLA and other value-added ag products.

When we did the study a few years ago, the market for high CLA dairy products barely existed, and our goal was to have public information ready and waiting for producers if and when the market developed. Greenberg and Klasna held interviews with CLA experts and cheese buyers in 2002, and their findings are still valid today. The CLA experts felt that it was premature to make bold health claims. The cheese buyers were unfamiliar with CLA, and emphasized that high-CLA cheese would have to compete favorably on flavor, cooking characteristics, and price. Then and now, the most prominent commercial source of high-CLA dairy products is Northern Meadows cheese produced by the Wisconsin Dairy Graziers Cooperative. The combination of award-winning taste, conservation advocacy, and potential CLA health benefits allows the farm to command cheese prices of $6.00/lb. - $7.50/lb. via mail-order and online sales, compared to the average U.S. retail cheddar cheese price of $4.46/lb. in September, 2004 (note: currency values in this paper refer to U.S. dollars).

There were three parts to the study that Sharon and I did. First, we processed prototype high-CLA dairy products and had consumers taste test and compare them to products that were not high in CLA. Second, we surveyed consumers on their willingness-to-pay for high-CLA dairy products with cancer-fighting potential. Third, we used enterprise budgets to estimate the profitability of high-CLA milk production and processing.

■ Prototype Development and Taste Testing

Four Holstein cows were fed a control ration and four cows were fed a ration containing menhaden fish oil at two percent of ration dry matter. The cows

were housed in a tie-stall barn for individual feed intake. For each four-week period, fish oil was gradually incorporated (not top-dressed) into the treatment ration over a six-day period. The cows remained on their rations for three weeks in each period. During the fourth week, milk was collected and processed into 2% milk, unsalted butter, and plain sweetened yogurt. CLA content was 1.9 percent of milkfat from cows on the experimental diet, and 0.3 percent of milk fat from cows on the control diet.

A total of 111 consumers participated in a taste testing and willingness-to-pay survey. Respondents received a control sample of milk and a high-CLA sample, labeled only with random three-digit numbers. After tasting the first randomly-chosen sample, respondents rated its flavor on a seven-point scale, drank water as a palate cleanser, and then tasted and rated the second sample. Respondents were asked if they noticed anything different between the two samples, and which sample they preferred, if any. The process was repeated with control and high-CLA samples of yogurt and butter.

A major goal of the taste testing component was to determine if feeding cows fish oil produced any persistent off flavors in the resulting dairy products. No consensus emerged regarding off flavors, and no one noted a fishy flavor in any of the products. Several respondents believed the high-CLA butter was smoother, more creamy, and softer. Undesirable flavors were most often attributed to the high-CLA milk, although no consensus on the nature of the flavor emerged. Given that CLA is a fatty acid, and 2% milk contained the lowest fat levels of the three products, the possibility exists that respondents tasted differences unrelated to CLA that we unintentionally introduced during processing. Specifically, a set screw on the cream separator got stuck, leading to thicker high-CLA cream, which we suspect got over-cooked during pasteurization because it took up less volume than the control cream

Figure 1 shows that when respondents had a preference, it was most often for the control products. A substantial portion of the respondents could not taste a difference between the high-CLA and control products. We held a less formal taste testing with high-CLA versus control gouda cheese that was made by a professional, small-scale cheesemaker using our high-CLA and control milk. Cubed samples labeled “A” and “B” were offered at a small, upscale food store, and shoppers were asked which they preferred, if any. Of the 49 responses, 14 preferred the control cheese, 16 preferred the high-CLA cheese, and 19 could not taste a difference between the high-CLA and control cheese. As with the milk, yogurt, and butter, no persistent off flavors were noted, but many shoppers commented that the high-CLA cheese had a softer texture.

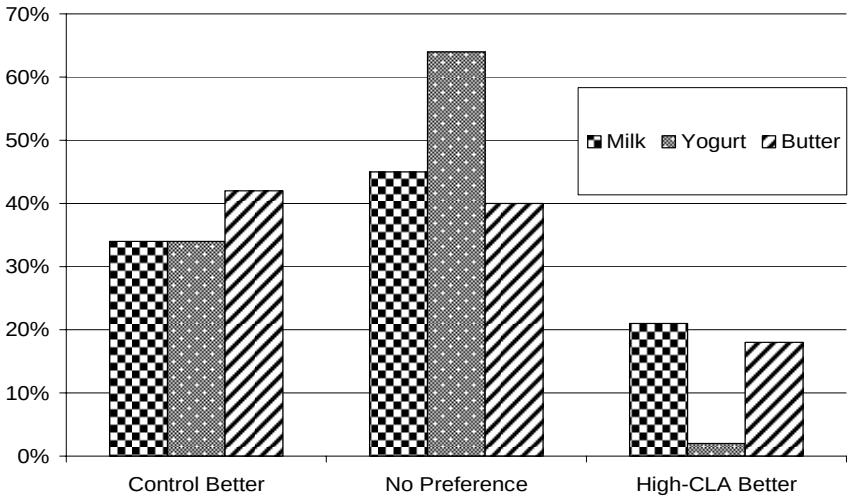

Figure 1. Consumer Taste Preferences for High-CLA vs. Control Dairy Products

Overall, the taste testing results indicate a need for caution and testing by experienced processors. High-CLA dairy products will not be commercially successful if they are not comparable in taste to conventional dairy products. Our results demonstrate a lack of persistent, identifiable off flavors in high-CLA products when fish oil is used to raise CLA levels. High-CLA cheese texture, shredding, and cooking attributes deserve more evaluation.

■ Willingness-to-Pay for Dairy Products that Help Fight Cancer

The second segment of the study measured respondents' willingness-to-pay for the cancer-fighting attribute of high-CLA dairy products. Participants first read a brief introduction describing the cancer-fighting benefits of CLA and how CLA levels could be raised in dairy products. A hypothetical scenario was then presented; "regular" and "cancer-fighting" dairy products were both available in the supermarket, they tasted the same, and they were identical in every other respect except price and that consistent consumption of "cancer-fighting" products would reduce the risk of developing four common types of cancer by 50 percent. The cancer types and risk reduction level were drawn from animal studies of CLA impacts. Next, participants viewed a risk ladder showing annual U.S. deaths per 100,000 people from various causes, ranging from heart

disease (268.0) to the four cancers affected by CLA (47.3) to lightning (0.1). The risk ladder was included to help respondents consider relative risks when choosing willingness-to-pay.

Participants were asked how much more they would pay for "cancer-fighting" milk, butter, and yogurt above and beyond the price of "regular" dairy products. Recent retail prices for each product were provided as a guide. Participants circled one of 15 values for each of the three products, and zero was one of the choices. The highest value listed for each product represented a 60-85 percent premium. Participants had the opportunity to write in a willingness-to-pay value if their choice did not appear on the payment card.

On average, respondents indicated willingness-to-pay $0.41 per gallon more for high-CLA milk, $0.38 per pound more for high-CLA butter, and $0.15 per eight-ounce cup more for high-CLA yogurt. Figure 2 shows the distribution of willingness-to-pay responses for each of the three products. Eighty percent of respondents, for example, expressed willingness-to-pay at least $0.20 per gallon of milk for the cancer-fighting benefit of CLA.

Following the sensory evaluation and willingness-to-pay sections of the survey was a group of 19 questions about respondents' dairy product consumption, preferences, priorities, and demographic information. Households with children and health-conscious consumers were the segments most likely to value high-CLA dairy products. For example, those who agreed that fat and cholesterol levels often influenced their purchases expressed average willingness-to-pay of $0.241 per gallon more for high-CLA milk than those who disagreed. Some respondents commented that their willingness-to-pay depended on the medical community's support of CLA as an anti-cancer agent.

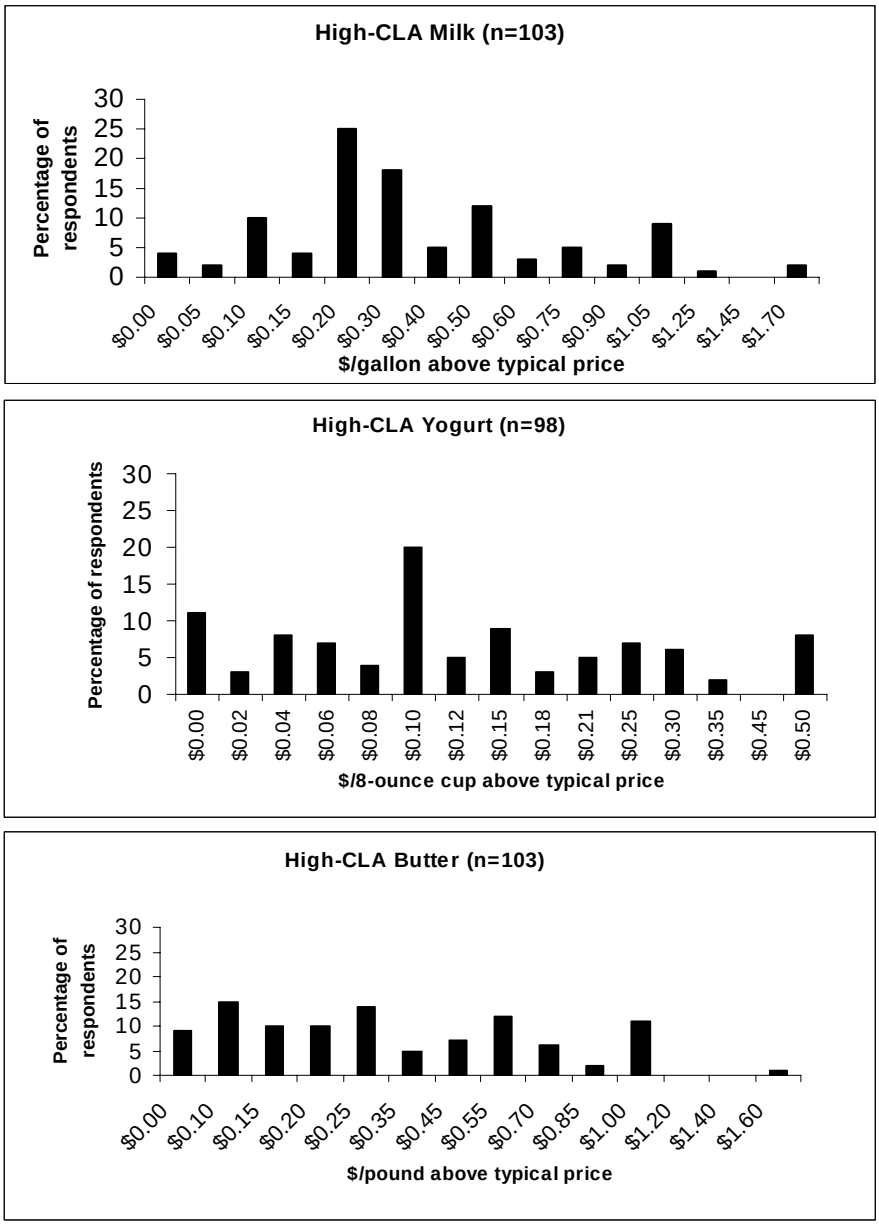

Figure 2. Willingness-to-Pay for High-CLA Dairy Products Above and Beyond the Typical Market Price

■ Estimated Costs of High-CLA Milk Production and Small-Scale Processing

Production costs were estimated on a scale consistent with a single farm. The CLA-enhancing feed regimen includes one pound of fish oil/cow/day at a quoted cost of $0.45/lb. At an average production level of 17,000 lb/cow/year, estimated additional feed costs of producing high-CLA milk are $0.97/cwt. Like other identity-preserved agricultural products, high-CLA milk needs to be segregated from other producers' milk. Transportation costs to a processing facility 50 miles distant added another $0.11/cwt to the farm-level cost of high-CLA milk production. An additional $0.10/cwt cost was added to account for CLA testing, feed mixing, and unforeseen costs, bringing the total estimated additional costs of raw high-CLA milk production to $1.18/cwt.

Estimated additional revenues from raw high-CLA milk production were based on milk equivalent conversion factors for milk, butter, and yogurt that represent the units of raw milk needed to produce a unit of processed dairy product. The farmer's share of the retail dollar was assumed to be 0.39 for milk and 0.32 for butter and yogurt, based on 1999 figures published by USDA. Given the assumptions, farmers producing raw high-CLA milk would break even if retail high-CLA price premiums were $0.35/gallon for milk, $0.33/lb for butter, and $0.04/cup for yogurt. Each represents less than a 15 percent markup from typical retail prices. Each breakeven premium was also lower than the average willingness-to-pay expressed in the survey, and lower than the willingness-to-pay reported by at least 40 percent of the respondents. Given that high-CLA dairy products would initially occupy a niche market serving those consumers willing to pay the highest premiums, the breakeven premiums seem attainable.

Recent interest in value-added processing by producers motivated a feasibility analysis of small-scale, high-CLA processing, summarized in Table 1. A supplier of turnkey mini-dairies (Pladot) provided capital cost estimates for processing facilities and equipment over a range of production scales ranging from 250 - 2,500 gal. milk /day. We chose the smallest scale as a conservative estimate that could apply to farms as small as 50 milking cows. The mini-dairy system was designed to fully utilize milk components by producing fixed proportions of milk, butter, yogurt, cheese, and sour cream. Based on quoted equipment costs of $234,000, installation costs of $30,000, assumed building construction costs of $100,000, an assumed useful life of 15 years, and an assumed interest rate of eight percent, capital costs were $5.32/cwt of raw milk.

Table 1. Summary High-CLA Enterprise Budget Based on Pladot 250 gal./day Mini-Dairy Processing System

Product	lb/day	retail price/lb	
Milk	513.00	$0.37	
Yogurt	630.00	$1.26	
Cheese	167.40	$4.00	
Sour cream	39.60	$1.00	
Butter	19.80	$2.62	
Revenue per day		$1,744.69	
Revenue per cwt of raw milk			$81.15
High-CLA raw milk production cost/cwt		$17.38	
Capital cost/cwt		$5.32	
Processing cost/cwt		$21.62	
Distribution cost/cwt		$8.00	
Retailing cost/cwt		$8.00	
Promotion cost/cwt		$4.00	
Unforeseen cost/cwt		$10.00	
Total cost per cwt of raw milk			$74.32
Expected profit per cwt of raw milk			$6.83
Expected profit per year			$53,584
Annual return on processing capital investment			15%

Total raw milk production costs of $17.38/cwt were based on an annual survey of Kentucky producers, and include costs of unpaid labor, depreciation, non-cash interest, and the estimated additional costs of producing high-CLA raw milk. Little information exists on dairy processing costs at such a small scale. Cost data for a sample of large California butter and cheese plants were available, and were grouped into low-cost and high-cost categories. The data account for miscellaneous ingredients, packaging, labor, nonlabor processing costs, general administration, and return on investment. As a conservative estimate, we tripled the high-cost category's value, resulting in average processing costs of $0.39/lb for butter and $0.64/lb for cheese. Processing costs for yogurt and sour cream were assumed to be $0.30/lb and processing costs for milk were assumed to be $0.20/lb. Given the fixed proportions of product manufactured by the mini-dairy system, estimated processing costs totaled $21.62/cwt of raw milk. Distribution and retailing costs were each budgeted at $8.00/cwt of raw milk, promotion costs were budgeted at $4.00/cwt of raw milk, and a $10.00/cwt item representing unforeseen costs was included so that errors were likely to be on the conservative side.

Typical retail prices plus breakeven farm-level premiums were used in calculating retail revenues. The retail cheese price was assumed to be

$4.00/lb, and the sour cream price was set at $1.00/lb. Based on the fixed proportions available with the mini-dairy system, and assuming 10 percent wastage, total revenue translated into $81.15/cwt of raw milk, implying before-tax profits of $6.83/cwt of raw milk. Estimated annual profits at the 250 gal/day scale were $53,584, an annual return on the processing capital investment of 15 percent. The results suggest that small-scale dairy product manufacturing offers potentially attractive opportunities for farmers willing to develop expertise in value-added processing and marketing.

To summarize the results of the study, CLA levels can be raised considerably with a feed ration containing fish oil. Taste testing results suggest that high CLA levels impact the texture more than the flavor of dairy products. Professional processors have greater control over flavor, texture, and uniformity than was possible in this study, and commercial potential will depend on ability to produce high-CLA dairy products comparable in taste to existing products. A substantial portion of consumers say they are willing to pay premiums for CLA's cancer-fighting attribute that exceed the cost of raising CLA levels. Households with children and health-conscious consumers expressed the highest willingness-to-pay for high-CLA dairy products. Profitable small-scale processing of high-CLA dairy products appeared feasible.

While the results of this study seem encouraging, caution is needed. No sizeable market for high-CLA products will evolve without more evidence of human health benefits. The U.S. Food and Drug Administration (FDA) now allows a qualified health claim on food labels about the benefits of omega-3 fatty acids, but the only health claims allowed for CLA relates to a synthetic CLA dietary supplement that increases lean muscle mass and reduces body fat. To obtain permission to make a qualified health claim about natural CLA, an exhaustive application must be submitted that allows the FDA to rate the strength and quality of science-based evidence about CLA's health benefits. In Canada, only five food health claims were permitted as of 2003, and the wording of the claims is more tightly regulated. One of the allowed claims works against promoting CLA because CLA is a trans fat: "a healthy diet low in saturated and trans fats may reduce the risk of heart disease." In November 2004, Health Canada and the Heart and Stroke Foundation of Canada launched a task force to encourage reduction in trans fat consumption, and in the U.S. trans fat labeling will be mandatory beginning in January 2006.

■ Lessons Learned During Value-Added Startups

The study that Sharon Franklin and I did was a useful start, but it doesn't anticipate all of the problems that might arise in the real world. This section covers a few of the issues that value-added start-ups encountered. Starting with consumer demand, willingness-to-pay studies usually ask consumers to assume that the value-added product is just as convenient to buy as the major

brands, but often value-added products first appear in specialty stores that require consumers to make an extra stop. In a later study dealing with a different product, we found that a large portion of consumers said they would buy the value-added product “often” if it were in the supermarket and cost the same as the competition. More than half of these people changed their answer to “rarely” when the product was only available at a specialty store.

What value-added attributes do consumers really want? Looking at several studies, consumers seem most willing to pay premiums for animal products raised without subtherapeutic antibiotics and added hormones. Humane and environmentally-sensitive production seems to be a second priority. Consumers are curious to try locally-produced foods, but product quality, uniformity, and packaging all need to be competitive with existing products before most consumers will consistently pay a premium for local production. One beef product start-up I worked with persisted in a marketing message of traceability and local production, but after losing precious months to low sales, they revised their marketing materials to emphasize outstanding quality. Farms that are currently producing or plan to produce high-CLA milk emphasize organic production and stewardship in their marketing strategies. Promoting this broader set of attributes encourages a broader customer base than relying on the high-CLA attribute alone.

If a start-up venture is to reach a wide audience, primary marketing channels are retail grocery chains, meat distributors, and restaurants. Each has its pros and cons. White tablecloth restaurants are attractive because purchasing decisions are often made by local, knowledgeable buyers who can promote their business by offering local products. Price is not always the most dominant factor. Many white tablecloth restaurants are willing to work with producers, but they worry that local supplies may be inconsistent and unreliable. A downside is low brand visibility.

Direct sales to retail grocery chains allow excellent brand exposure. By self-distributing, a company might retain more of the value-added premium as profit. Retail buyers, however, are under intense pressure to weed out nonperforming products. Slotting fees put the burden of failure on the supplier. Retailers have little tolerance for delivery and packaging inconsistency. Buyers are in a position to drive hard bargains, and are forced to in the struggle for survival against low-price superstores.

Distributors offer an alternative, for a price. Distributors act as an intermediary that can seek out buyers and negotiate on a more equal footing. The biggest advantage of using a distributor is that it will perform many marketing functions more effectively than a small company. Using distributors, however, implies sharing the value-added premiums, and distributors may also have a frustrating bargaining advantage over small suppliers.

The allure of cutting out the middleman and capturing larger profits runs headlong into the reality that supplying marketing services is expensive, and is already being performed amazingly efficiently by established competitors. Transportation costs mount as product must often be trucked long distances in partial loads. Processing costs are not competitive with those of the big manufacturers. If processing is outsourced, the small start-up staking its fragile reputation on uniform, high-quality products must rely on the competence of less motivated individuals at the processing plant. Small value-added companies are often founded on the principle of raising returns to producers, but paying producers generously conflicts with the need for cost control. The consumer's willingness-to-pay must be high enough to not only pay for the additional cost of adding valuable attributes; it must also make up for the relative cost inefficiency of the small start-up. If only certain milk components are used, a market has to be found for the remaining components.

An intimidating challenge of getting a new venture off the ground is that many decisions need to be made simultaneously, each decision impacts each of the other decisions, and there is never enough information to know whether one is making the right decision. The threats to a new business are diverse. One value-added company in my area had a high-quality product and was making good progress toward developing markets and improving cost efficiency, but simply ran out of time and faced a cash-flow crisis. A similar company had the opposite problem: it actually obtained shelf space in a major supermarket chain, but got kicked out when it was unable to keep up with demand. Annie Wilson provides a detailed account of the demise of the Tallgrass Prairie Producers Coop, and although it was a beef company, many of the lessons learned are relevant to a value-added dairy start-up.

The May, 2004 Graze magazine article "Learning in the CLA school of hard knocks" should be required reading for anyone thinking about marketing high-CLA dairy products. The Wisconsin Dairy Graziers Cooperative hired a cheese broker, expecting this would free them from the time demands of marketing. Based on sales forecasts that were too optimistic, they produced 70,000 pounds of Cheddar cheese in 2001, some of which is still eating up money in storage costs. The relationship with the commodity-oriented broker eventually broke down, forcing co-op members to take on time-consuming marketing tasks that conflicted with farming and family responsibilities. Even with the publicity boost from a first-place showing at the World Championship Cheese Contest, the group has learned that sales are tied to the time spent directly talking to buyers. On the supply side, high prices for organic milk in 2004 gave members little incentive to divert milk into cheese production, where they would not only take a $4/cwt. price cut but would also have to do the marketing work. The group is still enthusiastic about their grass-fed product, but believes that superior taste allows them to command premiums more than high CLA content.

In the end, this story boils down to the message that high-CLA dairy products might be a profitable way to tap into growing consumer interest in wellness, but they are not "low-hanging fruit" that will produce profits easily, and high CLA levels alone will not be enough to command high premiums. In both Canada and the U.S. there is public funding supporting entrepreneurism, and the opportunity to finance capital costs with grant funds can encourage investment. Value-added processing and marketing requires producers to develop new business skills and experience. The local farmer/cheesemaker who made our gouda cheese is by all accounts a success story, but emphasizes that the cheesemaking business developed over several years, and would not have been possible without the unpaid labor of family members. Important keys to entrepreneurial success seem to be an extremely high, sustained level of commitment to the effort and a refusal to quit in the face of setbacks.

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