

Fact Sheet: Grade A Raw Milk In Texas

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Economic Benefits of Raw Milk

Direct farm-to-consumer sales of raw milk can mean the difference between a net loss on the farm and the ability to provide a reasonable income for the farm family. Below are numbers drawn from actual Texas dairy farmers. These numbers do **not** cover the full range of potential situations, but provide a sample of the real-world economics of dairy.

Every \$1 earned on the farm equates to \$5-\$7 for the local community. By providing a fair income for rural dairy farmers, Grade A sales of raw milk can help our struggling rural economies.

CONVENTIONAL DAIRY FARM

- Cost of production:
100-cow dairy: \$1.50/gallon
- Price for milk sold for pasteurization:
\$1.13/gallon (current price) to \$2.19/gallon
(last year's high price)
- Net: ranges from 33 cents/gallon *loss* to
69 cents/gallon profit
- Price is based on market forces outside the
farmers' control. While consumers pay \$3
to \$6.50 for a gallon of pasteurized milk,
farmers see only a small percentage of that
money.
- In 2002, dairy farms in the U.S. went out of
business at the rate of 16 farms per day.
Dairy farms are currently facing a crisis.¹

DIRECT SALES OF RAW MILK

- Cost of production:
100-cow dairy: \$1.64-\$2.36/gallon
10-cow dairy: \$9/gallon
30-goat dairy: \$8.50/ gallon
- Price for raw milk sold directly to consumers:
\$5/gallon to \$10/gallon for raw cow's milk;
up to \$14.50/gallon for raw goat's milk
- Net: ranges from \$1/gallon to \$6/gallon profit
- Price is *not* subject to typical market
fluctuations, but is generally based on factors
within the farmers' control, such as the breed
of cow and extent of pasture grazing. The
farmer captures the full retail value.
- Capital investment in milking barn that meets
Grade A Standards: \$40,000 and higher

¹ See, e.g., G. DiGiuseppe, Dairy Crisis, American Dairymen, <http://www.americandairymen.com/articles/dairy-crisis>;
Posting by U.S. Senator Bernie Sanders, <http://sanders.senate.gov/legislation/issue/?id=90C28EE4-5607-4EAF-90B4-1E400D5458D3>;

Existing Regulations

Our proposed change is narrowly tailored to address the marketing barrier created by the current restriction on the location of sales. We are *not* recommending any changes to the extensive regulations placed on Grade A producers that address health and safety concerns, found at 25 TAC Chapter 217. Below are some highlights of the existing regulations that would remain unchanged.

- Dairy farms, both facilities and records, are inspected twice every 6 months (217.26a)
- If a condition is found that poses an imminent health hazard, the department is required to suspend the dairy's permit immediately (217.26d)
- Samples of the milk are collected *at least* every six weeks and tested for: bacterial counts, coliform counts, somatic cell counts, water adulteration, and cooling temperatures. (217.27)
 - At least twice every six months, the samples are also tested for pathogenic bacteria
 - At least four times every six months, the samples are also tested for antibiotics
- Grade A raw milk must meet the following standards (217.28)
 - Cooled to 45 degrees or less within 2 hours (also regulated in 217.29s).
 - Somatic cell counts not to exceed 750,000 per milliliter (ml) for cow's milk or 1,000,000/ml for goat's milk.
 - Bacteria limits of 20,000 per ml (not applicable to cultured products).
 - Coliform not to exceed 10 per ml.
 - Pathogen limit of zero.
- Section 217.29, Sanitization Requirements for Grade A Raw Milk, has 20 subparts, which have in turn multiple sub-subparts, of rules (217.29). Some highlights include:
 - Abnormal milk shall be discarded, and animals which show evidence of abnormal secretion must be isolated from the non-abnormal milk and equipment cleaned (a)
 - Milk barn must meet detailed construction and cleanliness requirements (b,c, e-g)
 - Animal yard shall be properly graded to prevent standing pools of water or waste, housing areas maintained to prevent soiling of animals udders and flanks (d)
 - Clean water in sufficient quantity for the dairy operations (h)
 - Containers, utensils and equipment must meet standards for construction (type of materials), cleaning, sanitization, storage and handling (i-m)
 - The animal and the milking equipment must be free from contamination (n-p)
 - People doing the milking must have clean hands, wear clean outer garments, and be free of infection (q, r)
 - Effective insect and rodent control is required (t)
- Animal Health: All herds shall be tested and found free of tuberculosis and brucellosis before any milk is sold; herds shall be retested at least every 12 months; cattle herds participate in brucellosis ring testing by Texas Animal Health Commission. For other diseases, the department may require physical, chemical, or bacteriological tests. (217.20)
- Plans for Grade A Raw for Retail Milk Dairy Farms shall be submitted to the department for approval before work is begun (217.30).

- Note that retail sales of raw milk are allowed in ten states: Arizona, California, Connecticut, Maine, Missouri, New Hampshire, New Mexico, Pennsylvania, South Carolina, and Washington.

Safety of Raw Milk

- **PROTECTIVE COMPONENTS OF UNPROCESSED MILK:** Raw milk contains numerous components that assist in:
 - Killing pathogens in the milk (lactoperoxidase, lactoferrin, leukocytes, macrophages, neutrophils, antibodies, medium chain fatty acids, lysozyme, B12 binding protein, bifidus factor, beneficial bacteria);²
 - Preventing pathogens from being absorbed across the intestinal wall (polysaccharides, oligosaccharides, mucins, fibronectin, glycomacropetides, bifidus factor, beneficial bacteria);³ and
 - Strengthening and modulating the immune system (lymphocytes, immunoglobulins, antibodies, hormones and growth factors).⁴
 - Note that breast milk is raw. The safety and health benefits of breast milk have been well documented.⁵
- **LOSS OF PROTECTIVE COMPONENTS DUE TO PASTEURIZATION:** Many of these anti-microbial and immune-enhancing components are greatly reduced in effectiveness by pasteurization.⁶
- **MODERN ADVANTAGES IN RAW DAIRY PRODUCTION:** Compared to 30-50 years ago, dairy farmers today can take advantage of many advancements that contribute to a much safer product, including rotational pasture grazing, milking machines, effective cleaning systems, and refrigeration. Milk and herd disease testing techniques are also easier, significantly less expensive, and more sophisticated than when pasteurization became commonplace.
- **RAW MILK IS A UNIQUE FOOD:** Raw milk is the only food that has built-in safety mechanisms and numerous components to create a healthy immune system.

² Shah, N.P. 2000. Effects of milk-derived bioactives: an overview. British J of Nutrition 84(Suppl. 1):S3-S10. Cross, M.L. and H.S. Gill. 2000. Immunomodulator properties of milk. British J. of Nutrition 84(Suppl. 1): S81-S89. Korhonen, H., P. Marnilla, and H.S. Gill. Milk Immunoglobulins and complement factors. British J. of Nutrition 84 (Suppl. 1): S75-S80. Arnold, D. et al. 2002. Antiadenovirus activity of milk proteins: lactoferrin prevents viral infection. Antiviral Res. 53:153-158. Dionysius, D.A. and J.M. Milne, 1997. Antibacterial peptides of bovine lactoferrin: purification and characterization. Journal of Dairy Science 80, 667-674. Campanella, L. et al. 2009. Determination of lactoferrin and immunoglobulin G in animal milks by new immunosensors. Sensors 9: 2202-2221. Seifu, E., E.M. Buys and E.F. Donkin. 2005. Significance of the lactoperoxidase system in the dairy industry and its potential applications: a review. Trends in Food Science & Tech. 16(4):137-154.

³ Shah (2000); Cross and Gill (2000); Korhonen et al (2000).

⁴ Shah (2000); Cross and Gill (2000); Korhonen et al (2000).

⁵ Newman, J. 1995. How breast milk protects newborns: some of the molecules and cells in human milk actively help infants stave off infection. Scientific American Dec. 1995 pp.76.

⁶ Shah (2000); Cross and Gill (2000); Korhonen et al (2000).

Health Benefits of Raw Milk

- **BENEFITS IN HUMAN STUDIES:** In early studies involving humans, raw milk was shown to be superior to pasteurized in protecting against infection, rickets, and TB; and children receiving raw milk had better growth than those receiving pasteurized milk.⁷
- **BENEFITS IN ANIMAL STUDIES:** In an early animal study, animals fed raw milk had better growth, less anemia, fewer signs of anxiety and stress, and fewer signs of nutrient deficiency than animals fed pasteurized milk.⁸
- **ASTHMA AND ALLERGIES:** Several recent studies in Europe have found that drinking “farm” (raw) milk protects against asthma and allergies.⁹
- **RAW HUMAN MILK:** Infants and premature babies on pasteurized human milk did not gain weight as quickly as those fed raw human milk; problems were attributed to pasteurization’s destruction of lipase.¹⁰ In another study, neonates given raw human milk had a markedly lower incidence of infection than those who received pasteurized human milk and formula.¹¹
- **LACTOSE INTOLERANCE:** In a survey of milk drinkers in the state of Michigan, over 80% of those advised by a healthcare professional that they were lactose intolerant were able to consume raw milk without problem.¹²
- **POSITIVE TESTIMONIALS:** There are hundreds of testimonials involving reversal of failure to thrive in infants; allergies, asthma and behavior problems in children; and digestive disorders, arthritis, osteoporosis and even cancer in adults.¹³

⁷ Parliamentary Intelligence. 1937. Milk Pasteurization: The Poole Experiment. Lancet 1141-43 (comments in the House of Lords referencing a study showing that raw milk decreases the likelihood of tooth decay and increased resistance to tuberculosis, compared to consumption of pasteurized milk). Ladd, M. et al. 1926. The relative efficiency of certified and pasteurized milk in infant feeding. Arch. Ped. 43:380-85 (found that babies fed raw milk had less frequent rickets and better weight gain compared to those fed pasteurized milk). See also Cornish, J. et al. 2004. Lactoferrin is a potent regulator of bone cell activity and increases bone formation *in vivo*. Endocrinology 145(9):4366-74.

⁸ Scott, E. and L.E. Erf. 1931. Ohio tests prove natural milk is best. Jersey Bulletin 50:210-211, 224-226 (documented normal growth, good health and gentle disposition in rats fed an exclusive raw milk diet. Rats fed pasteurized milk were anemic, had slow growth, rough coats, loss of vitality and weight, and were very irritable, often showing a tendency to bite when handled).

⁹ Riedler, J. et al. 2001. Exposure to farming in early life and development of asthma and allergy: a cross-sectional survey. Lancet 358:1129-33. Perkin, M.R. and D.P. Strachan. 2006. Which aspects of the farming lifestyle explain the inverse association with childhood allergy? J Allergy Clin Immunol. 117(6):1374-8. Perkin, M.R. 2007. Unpasteurized milk: health of hazard? Clinical and Experimental Allergy 37:627-630.

¹⁰ Pettifor, J.M. et al. 1986. Mineral homeostasis in very low birth weight infants fed either own mothers’ milk or pooled pasteurized preterm milk. J Pediatr Gastroenterol Nutr. 5(2):242-53.

¹¹ Antibiotic-like action of essential fatty acids. 1985. Can. Med. Assoc. J. 132:1350 (referencing Narayanan, I. et al. 1984. Randomised controlled trial of effect of raw and holder pasteurized human milk and of formula supplements on incidence of neonatal infection. Lancet 2:1111-1113).

¹² www.realmilk.com/documents/LactoseIntoleranceSurvey.doc

¹³ <http://www.realmilk.com/testimonials.html>; www.realmilk.com/MI-RawMilkHealthTestimonials.pdf

- NUTRIENTS RETAINED IN RAW MILK:¹⁴

Vitamin A	Beta-lactoglobulin, a heat-sensitive protein in milk, increases intestinal absorption of vitamin A. Heat degrades vitamin A. ¹⁵
B Vitamins (incl. folate)	Significant percentages of Vitamins B6, B12, thiamin and folate are destroyed by heat treatment, although the specific percentages found vary from study to study. ¹⁶ In addition, the folacin-binding protein in raw milk is rendered ineffective during pasteurization and processing. ¹⁷
Vitamin C	Heating leads to a loss of Vitamin C in pasteurized milk. ¹⁸ “Without doubt, the explosive increase in infantile scurvy during the latter part of the 19 th century coincided with the advent of use of heated milks and proprietary foods. ... Hess [a pediatrician] was able to effect a cure for scurvy by providing raw milk or orange juice or potatoes.” ¹⁹
Vitamin D	Vitamin D is present in milk in protein-bound form, which may be lost during pasteurization. ²⁰

¹⁴ Haug, A., A.T. Hostmark, and O.M. Harstad. 2007. Bovine milk in human nutrition—a review. Lipids Health Disease 6:25 (“Proteins and peptides are heat sensitive, and their bioactivity may be reduced by pasteurization of milk. Heating of milk may also result in the formation of potentially harmful new products, i.e. when carbohydrates in milk react with proteins.”). Wong, D.W.S. and W.M. Camirand. 1996. Structures and functionalities of milk proteins. Critical Rev Food Science Nutr. 36(8): 807-844.

¹⁵ Said, H.M., D.E. Ong, and J.L. Shingleton. 1989. Intestinal uptake of retinol: enhancement by bovine milk Beta-lactoglobulin. Am J Clin Nutr. 49:690-694. Runge, F.E. and R. Heger. 2000. Use of microcalorimetry in monitoring stability studies. Example: Vitamin A Esters. J Agric Food Chem 48(1):47-55.

¹⁶ Kilshaw, P.J., L.M. Heppell, and J.E. Ford. 1982. Effects of heat treatment of cow's milk and whey on the nutritional quality and antigenic properties. Arch Disease Childhood 57: 842-847 (heat treatment destroyed all of the Vitamin B12, about 60% of the thiamin and Vitamin B6, 70% of the ascorbic acid, and about 30% of the folate).

¹⁷ Gregory, J.F. 1982. Denaturation of the folacin-binding protein in pasteurized milk products. J Nutr. 112: 1329-1338.

¹⁸ Effect of several heat treatments and frozen storage on thiamine, riboflavin, and ascorbic acid content of milk. J Dairy Sci. 66: 1601-6;

¹⁹ Rajakumar, K. 2001. Infantile scurvy: a historical perspective. Pediatrics 108(4):E76.

²⁰ Hollis, B.W. et al. 1981. Vitamin D and its metabolites in human and bovine milk. J Nutr. 111:1240-1248. See also Leveux, D. 1980. Heat denaturation of whey proteins: comparative studies with physical and immunological methods. Ann Rech Vet. 11(1): 89-97 (“Nutritionists believe that high losses of nutritive value occur in heated proteins following cross-linking since high cross-linked proteins cannot be degraded by digestive enzymes.”).