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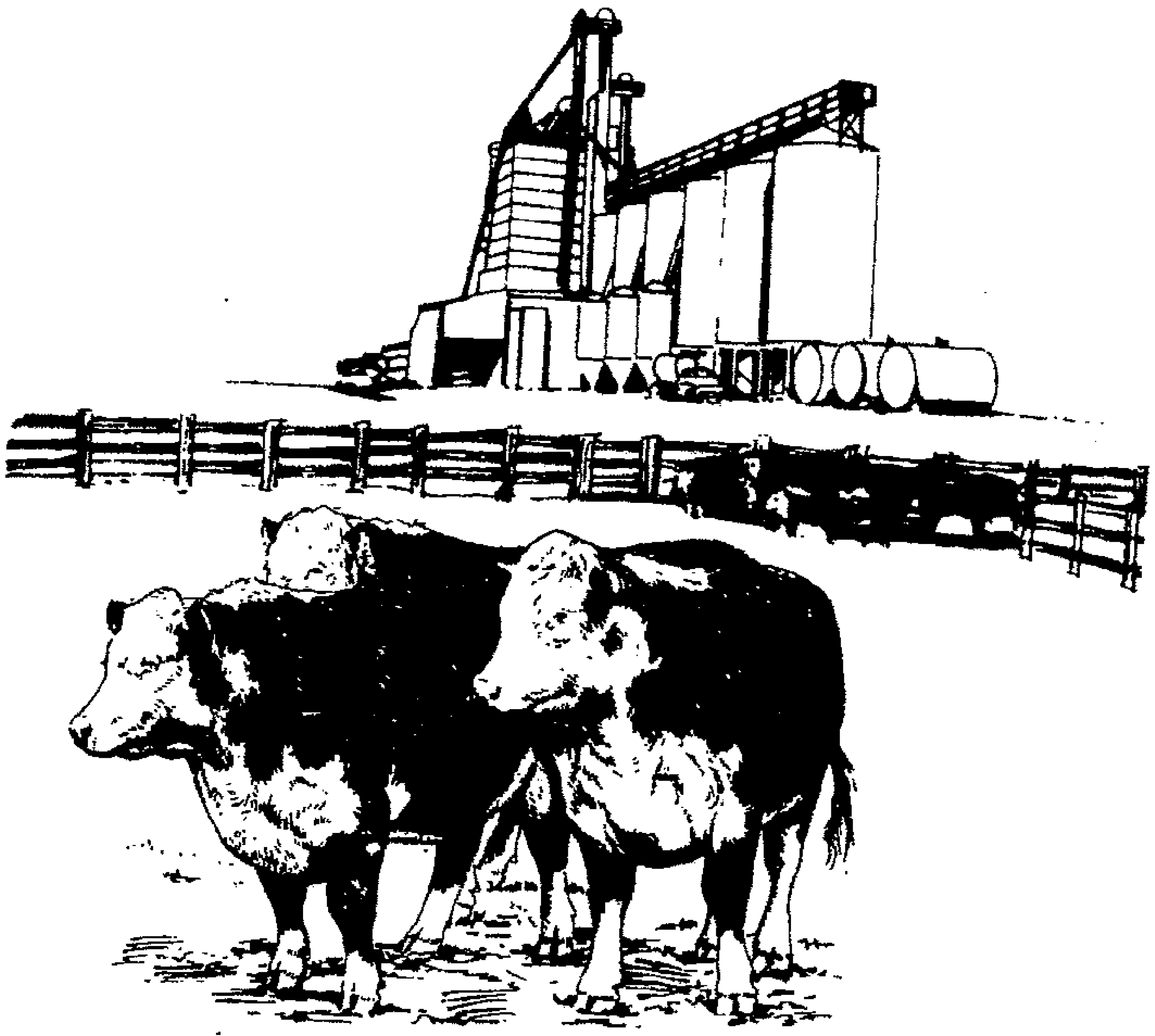

Feedyard Energy Guidelines

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FEEDYARD ENERGY GUIDELINES

Energy costs at cattle feedyards are a significant production cost that can be stabilized or lowered through careful equipment selection and energy management. Energy consumption and cost varies widely between feedyards, especially on a per-head basis. Cattle feeding is generally based on least-cost ration formulation that considers the cost of ration ingredients, but usually fails to consider the comparative energy cost of processing and handling those ingredients. Energy utilization and conservation may be the greatest challenge facing the feed processing industry today (AFMA, 1980). Farm management specialists estimate that livestock producers generally can save 10 - 20% of their current energy use by working at conservation (Van Arsdall et al., 1977). Effective energy management can reduce costs, enhance profits and insure company survival.

The purpose of this report is to provide methodology and supporting information for analyzing energy consumption and cost for major energy use centers at a cattle feedlot and for evaluating alternative methods. This report is intended to serve as a practical self-analysis guide that feedyard managers, assistant managers, foremen, and operating personnel can use to make changes that result in reduced energy consumption and cost. A general discussion of the major energy use centers and components is followed by analytical guidelines and conservation checklists. Many energy conservation measures are relatively simple and cost effective, while others such as equipment replacement are capital intensive and often should be postponed until other process changes become necessary.

VII. CATTLE WATERING SYSTEMS

This section covers primarily the fundamentals of selecting and managing systems to supply cattle drinking water. However, the principles are equally applicable to other pumping situations such as land disposal of collected feedlot runoff from holding ponds and irrigation systems on farmland connected with the feedyard.

Water Requirements

Drinking water requirements at cattle feedlots vary considerably from about 5 to 20 gal/head/day. Data from a TCFA-member feedlot (28,000 head) on metered city water supply indicated an average consumption of 7.0 gal/head/day, and a range of 4.2-10.3 gal/head/day, for an eleven month period in 1984-1985 (Jay, 1985). Peak water requirements occurred from June-September and lowest levels in the winter months.

According to Fields (1985), cattle water consumption can be estimated at 4 lbs water (or 0.48 gallons) per pound of dry feed consumed, and daily dry feed consumption is about 2% of body weight. However, peak consumption may be twice the average. With this guideline, the total feedlot water supply for cattle drinking purposes is shown in Table 16. This data illustrates that for an 80% dry matter ration, an 800 lb animal will consume 9.6 gallons of water per day. And a 10,000 head feedlot would need a minimum continuous water pumping rate of 67 gallons per minute (gpm) to meet average demand or about 134 gpm to meet peak demands. The pumping rate for 8 hours/day would need to be at least 200 gpm for a 10,000 head feedlot, and 800 gpm for a 40,000 head feedlot (400 gpm and 1,600 gpm for peak demand respectively).

At some feedlots, additional water is needed to supply continuous overflow watering troughs for protection against freezing. The 1979 TCFA feedlot survey determined that the continuous pumping rate for overflow watering systems at 27 feedlots ranged from 0.25 to 10 gpm/trough and averaged 2.8 gpm/trough. For an

TABLE 16. CATTLE DRINKING WATER REQUIREMENTS* (gal/head/day) AND NEEDED PUMPING RATE PER 10,000 HEAD CAPACITY

Liveweight lbs/hd	Dry Feed Consumption lbs/hd/day	Average Daily Water Consumption, gal/hd Dry Matter in Ration, %			Minimum Continuous Pumping Rate, gpm** Dry Matter in Ration,%		
		70	80	90	70	80	90
600	12	8.2	7.2	6.4	57	50	44
800	16	11.0	9.6	8.5	76	67	59
1000	20	13.7	12.0	10.7	95	83	74
1200	24	16.5	14.4	12.8	115	100	89

*After Fields, 1985.
**To handle peak demands, multiply pumping rate shown by 2; and, for 8 hour/day operations, multiply by 3.

average pen size of 200 head per trough, a rough estimate of water consumption plus overflow averages 20 gal/head/day. Thus the additional pumping rate needed to supply the continuous overflow waterers per 10,000 head of feedlot capacity is about 70 gpm, which is comparable to the cattle water consumption (Table 16).

Above-ground water storage capacity equal to at least 1/2 day feedyard supply is recommended. This should usually take the form of a pressurized or gravity tank at the highest point of the feedlot. For each 10,000 head on feed, the storage tank should have 50,000 gallons of net storage at all times.

This storage guideline appears reasonably consistent with normal practice at many feedyards. Drinking water storage tanks at 46 feedlots averaged 59,000 gallons capacity, or 4.1 gallons per head of feedlot capacity (Sweeten and McDonald, 1979). However the storage capacity varied enormously from 0 to 17.1 gallons per head (0-564,000 gallons total).

Energy used in connection with the feedlot watering system occurs from two functions: pumping water and heat for freeze protection. The energy requirement for water pumping depends on these factors:

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