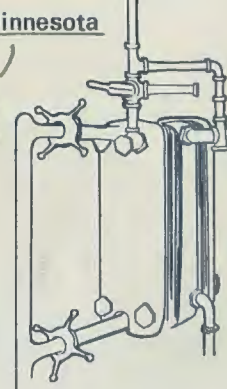
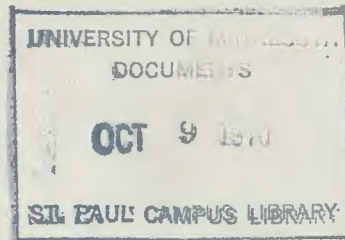


MINNESOTA DAIRY PRODUCTS PROCESSOR



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BULK TANKS AND QUALITY OF MILK

Several problems have been creeping up on us as bulk tank usage has increased over the years. Tanks are being misused and milk quality is suffering as a result. Some of the more obvious bad practices are those of (1) picking up milk at intervals greater than two days, (2) filling tanks designed for every other day pickup on an every day basis, and (3) failing to purchase tanks of adequate size when the initial or replacement tank is installed. If new milkhouse construction is required, this additional cost must figure strongly in a producer's decision-making process. So the problems tend to mount and we have difficulty obtaining the kind of milk today's market demands.

SOME THOUGHTS TO CONSIDER

Around the country, a variety of approaches is being taken. Some states have adopted laws which make replacement tank installations illegal if the new tank is installed in the same location as the old tank. We hear of recording thermometers being considered as mandatory farm equipment so that cooling rate records will be available to the regulating agency. And one rather interesting idea that came to our attention was a wall-type bulk tank installation. Only a couple feet of the tank face protrudes into the milkhouse. The rest sits outside on a cement platform. In actual cost, this installation should be cheaper than one which requires either new or major milkhouse reconstruction.

In any event ideas are beginning to filter in. We would hope that possible solutions would consider cost and convenience to the producer and reasonableness and effectiveness of regulation, if indeed new regulations are found necessary.

SIZING BULK TANKS

In recent years the rating of condenser capacity has been changing from horsepower to B.T.U.'s per hour. The latter is more precise and is, therefore, a better gauge of tank cooling capacity. Dr. C. Ludington of Cornell University has developed tables to help figure size requirements on a B.T.U. per hour basis. These tables appear on the following pages. These capacity ratings were calculated, as closely as possible, to meet 3-A cooling performance standards.

Table 1. Recommended Condensing Unit Capacity
Direct Expansion Cooling System

Gallons per Loading	Tank Capacity*		Capacity of Condensing Unit, BTU/hr. Loading Time**		
	ED	EOD	90 min.	75 min.	60 min.
50	100	200	8250	9950	12400
75	150	300	12375	14925	18600
100	200	400	16500	19900	24800
125	250	500	20625	24875	31000
150	300	600	24750	29850	37200
175	350	700	28875	34825	43400
200	400	800	33000	39800	49600
225	450	900	37125	44775	55800
250	500	1000	41250	48750	62000
275	550	1100	45375	54725	68200
300	600	1200	49500	59700	74400
325	650	1300	53625	64675	80600
350	700	1400	57750	69650	86800
375	750	1500	61875	74625	93000
400	800	1600	66000	79600	99200
425	850	1700	70125	84575	105400
450	900	1800	74250	89550	111600
475	950	1900	78375	94525	117800
500	1000	2000	82500	99500	124000

*ED - Every day pickup

EOD- Every-other-day pickup

**Capacity rated at 90 F. ambient and 30 F. suction temperature

Table 2. Recommended Condensing Unit Capacity
Ice Bank Cooling System

Gallons per Loading	Tank Capacity*		Capacity of Condensing Unit, BTU/hr. Ice Building Period**	
	ED	EOD	8 hour	10 hour
50	100	200	3050	2450
75	150	300	4575	3675
100	200	400	6100	4900
125	250	500	7625	6125
150	300	600	9150	7350
175	350	700	10675	8575
200	400	800	12200	9800
225	450	900	13725	11025
250	500	1000	15250	12250
275	550	1100	16775	13475
300	600	1200	18300	14700
325	650	1300	19825	15925
350	700	1400	21350	17150
375	750	1500	22875	18375
400	800	1600	24400	19600
425	850	1700	25925	20825
450	900	1800	27450	22050
475	950	1900	28975	23275
500	1000	2000	30500	24500

*ED - Every day pickup

EOD- Every-other-day pickup

**Capacity: rated at 90 F. ambient and 25 F. suction temperature

OVERALL COOLING PERFORMANCE

In a true consideration of cooling performance, Ludington points out that cooling surface capacity must be considered as seriously as condensing unit capacity. In fact cooling surface, condensing unit, and milk holding capacity should be designed for each individual farm because milking time and rate are variables unique to each farm. If load time is very fast, the impact on cooling performance is significant. Assuming that evaporator capacity is directly related to tank size, then a farmer loading a tank in 75 minutes will require a tank 25% larger in holding capacity than is actually needed (in terms of milk volume). Sixty minute loading time would demand a tank 50% larger than necessary if, indeed, 3-A standards are to be met. In direct expansion systems, such large units might cause milk to freeze.

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