

WHAT'S NEW IN FREQUENCY OF MILKING COWS

*by D.W. Webb and H.H. Head
University of Florida
Gainesville, Florida*

Three-time (3X) milking was quite popular 25 to 30 years ago but was then not practiced widely for a number of years. Apparently, the thinking was that 3X milking was not worth the trouble. However, during recent years, limited interest in 3X milking has returned. With today's larger herds, the fixed costs of milking facilities have increased and labor costs have become a smaller portion of total costs. Further, with longer milking shifts and single shifts on many dairies, 3X milking becomes more feasible to schedule.

A number of Florida dairies have experimented with 3X milking and many are employing this practice currently. Several questions regarding 3X milking are apparent.

1. Do cows milked 3X give more milk than if milked 2X? The answer is yes.
2. Why?
 - a) More frequent emptying of the mammary gland allows less pressure build-up.
 - b) Greater frequency of udder stimulation increases oxytocin releases. Oxytocin itself may stimulate milk synthesis even in the absence of milk removal. This is referred to as the galactopoetic effect of oxytocin.
 - c) More frequent milking causes more frequent release of the hormones (prolactin, growth hormone, ACTH) which are necessary to maintain and stimulate milk synthesis.
3. How much increase can be expected and which cows will benefit most from 3X milking?

Factors to correct 3X records to 2X equivalent have been in use for a number of years. The reciprocals of these factors give the expected increase from milking 3X for cows of different ages and milked 3X for different durations (table 1). The factors indicate a 15-20% increase in production for cows milked 3X for the entire lactation.

One California study compared 3X and 2X production. Cows were paired on the basis age and season of calving. The control group was milked 2X the entire lactation. Cows in the test group were milked 3X for periods varying from 2 to 9 months and 2X the rest of the time. Results (table 2) show a 16.6% advantage for 3X including all cows in the study.

A study from New England reported recently in *Hoard's Dairyman* compared 2X and 3X milking. Cows were started on 2X milking then changed to 3X. Actual 3X production was compared to "expected" 2X production on two monthly test days following the switch-over. The results indicated a 10-12% difference for two-year olds and 6-7% increase for cows in second or later lactation (table 3).

USDA researchers at Beltsville have studied effects of 3X milking in early lactation. Three milking schemes were compared in a preliminary study: 1) 2X for the entire lactation 2) 3X until production dropped below 53 pounds (at least 45 days 3X and no more than 150 days) and 3) 3X until production dropped below 68 pounds (not less than 45 and no more than 150 days 3X). The 2X milking intervals were 10 and 14 hours. The 3X intervals were 10, 8 and 6 hours.

Cows in the 3X-53 group stayed on 3X for an average of 143 days. Cows on 3X-68 averaged 93 days on 3X milking. Results (table 4) indicate an 8% increase for cows milked 3X-53 and 5.5% for cows on the 3X-68 scheme. Table 5 shows the effect of switching cows from 3X back to 2X milking. Figure 1 shows a graph of the experiment's results.

Arizona has major interest in 3X milking. About 30% of the cows on DHIA in the state are currently being milked 3X. A comprehensive study of 3X milking, its costs and returns is underway. Preliminary data indicate about 17% increase in production with 7-8% required to break-even. Of all herds on 3X, 8% is the smallest increase yet observed. The majority of the increase has been apparent in 10 days. Accompanying increase in feed intake is averaging about 5% (net energy basis).

4. Should cows be milked 3X for the entire lactation?

I don't think we can answer this question fully. I have talked with many people who feel that switching cows from 3X to 2X causes them to produce at a level below where they would if milked 2X for the entire lactation. The Arizona workers feel this way. I am still unsure.

5. Will it pay dollars to milk 3X?

Yes, for some but not for all. The data indicate that not much response will be realized until after the peak of lactation and therefore switching back to 2X too early or at too high a level may be counterproductive.

In summary we can say that:

1. 3X milking does increase production;
2. feed efficiency is improved with 3X milking;
3. 3X milking is not a cure-all - it will not improve poor management but requires better management;
4. higher producing cows will show greater response although data indicate that the percentage increase is not different;
5. two-year olds may show greater response than older cows of equal production;
6. we are not sure whether 3X milking will show its greatest benefit if practiced throughout the entire lactation, only in early post-peak or during late lactation when persistency declines greatest.

Table 1. DHIA FACTORS FOR PREDICTING 3X PRODUCTION FROM 2X.

DAYS MILKED 3X	AGE AT CALVING		
	UP TO 36 MOS.	36 TO 48 MOS.	OVER 48 MOS.
90	1.053	1.046	1.039
120	1.072	1.063	1.054
150	1.092	1.080	1.068
180	1.111	1.096	1.083
240	1.155	1.147	1.114
305	1.205	1.176	1.149

K.R. Butcher, DRPC at Raleigh, N.C.

Table 2. 3X VS. 2X MILK AND FAT PRODUCTION

LACTATION NO.	1	2	3 OR MORE	ALL
TEST DAY COMPARISONS	154	138	189	481
3X MILK (lbs./day)	64.00	74.70	79.20	73.00
2X MILK (lbs./day)	54.50	64.30	68.10	62.60
INCREASE	9.50	10.40	11.10	10.40
% INCREASE	17.40	16.20	16.30	16.60
3X FAT (lbs./day)	2.23	2.56	2.75	2.53
2X FAT (lbs./day)	1.89	2.19	2.39	2.17
INCREASE	.34	.37	.36	.36
% INCREASE	18.00	16.90	15.10	16.60

CALIFORNIA STUDY 1978.

Table 3. COMPARISON OF 3X PRODUCTION TO "EXPECTED" 2X PRODUCTION.

STATE OF LACTATION	FIRST LACTATION		SECOND AND LATER LACTATION	
	FIRST SAMPLE	SECOND SAMPLE	FIRST SAMPLE	SECOND SAMPLE
VERY EARLY	6.4 lbs	6.7 lbs	6.0 lbs	3.8 lbs
EARLY	5.4	6.7	1.5	1.7
MID	5.1	4.3	4.8	3.6
LATE	3.5	5.5	5.1	4.0
AVERAGE	5.1	5.8	4.4	3.3
%	+10.0	+12.2	+7.6	+6.5

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Table 4. THREE-TIMES-A-DAY MILKING STUDY
(CUMULATIVE MILK YIELDS AT VARIOUS STAGES OF LACTATION)

No. of Days		2X	3X ₅₃	3X ₆₈
		-----lbs-----		
56	Milk yield	3672	3722	3725
	Milk discarded	211	194	304
154	Milk yield	9273	10091	9746
	Milk discarded	733	317	480
180	Milk yield	10562	11552	11103
	Milk discarded	840	378	596
280	Milk yield	14223	15367	15006
	Milk discarded	977	422	697
Increase over 2X milking			1147 lbs 8.0%	785 lbs 5.5%

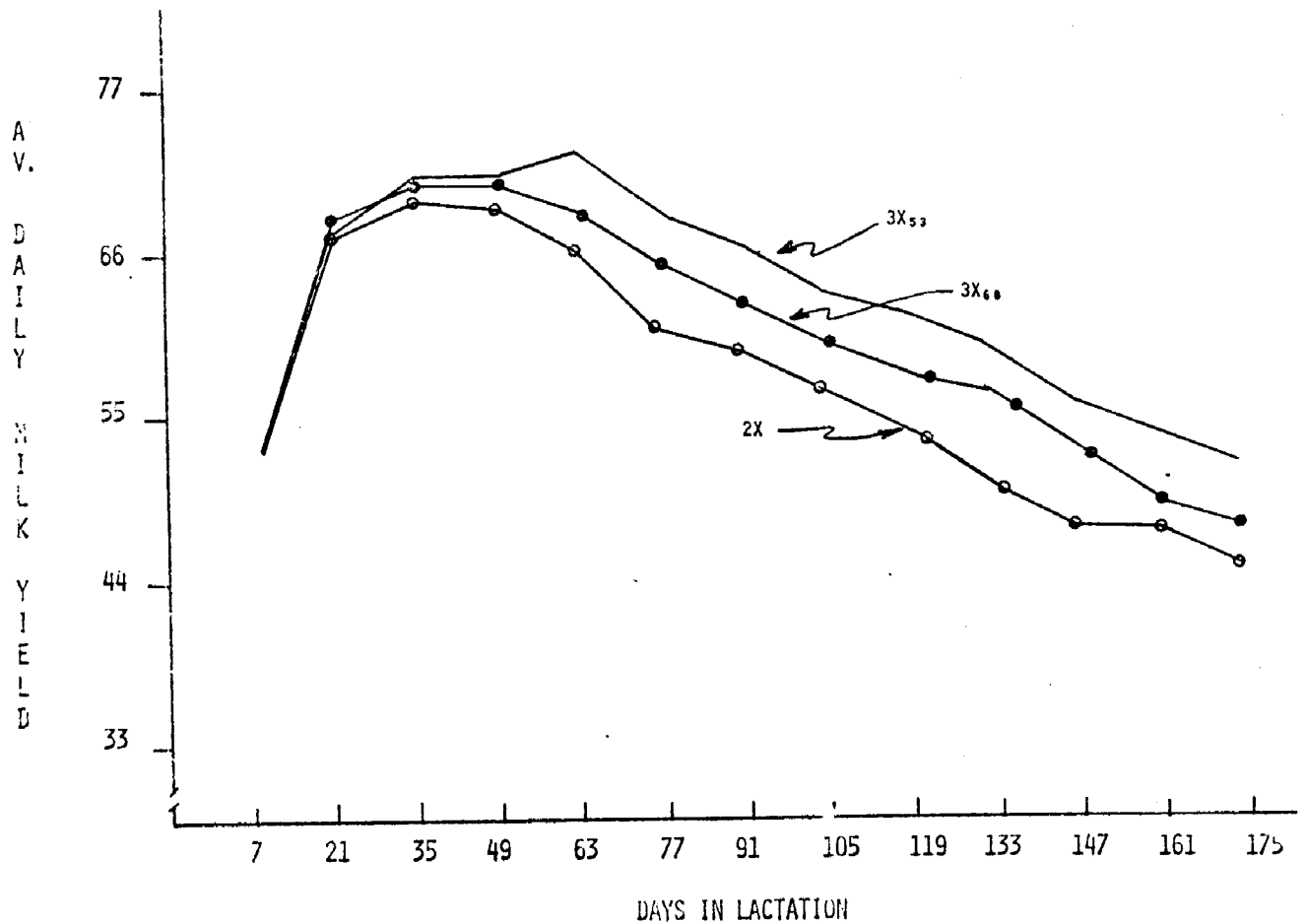
R.E. Pearson. USDA, Beltsville

Table 5. THREE-TIMES-A-DAY MILKING - AVERAGE MILK YIELD BEFORE AND AFTER CHANGE FROM 3X TO 2X.

Item	Average Daily Milk Yield	
	3X ₅₃	3X ₆₈
	-----lbs-----	
7 days before change	59.6	64.2
Day after change	46.0	48.0
Days 2 and 3 after change	55.7	59.8
Days 4 to 7 after change	55.9	59.5
Days in milk at change	143	93

R.E. Pearson, USDA, Beltsville.

FIGURE 1



R.E. Pearson, USDA, Beltsville