

PN-ACD-082

98479



CHEMONICS INTERNATIONAL INC

MARKET-ORIENTED FARM SUPPORT ACTIVITY

**EVALUATION & RECOMMENDATIONS
FOR THE VOLOGDA DAIRY INDUSTRY**

Submitted to
U S Agency for International Development
Under Contract No EPE-0006-C-00-6007-00

Submitted by
Chemonics International Inc
1133 20th Street N W Suite 600
Washington, D C 20036
Tel (202) 955-3300, Fax (202) 955-3400

Prepared by
National Cooperative Business Association
1401 New York Avenue N W Suite 1100
Washington D C 20005
Tel (202) 638-6222, Fax (202) 638-1374

May 1997

PN-ACD-082

This report was completed by short-term Dairy Nutrition Specialist,
Mr Lee Kilmer, for the MOFSA Project in Vologda, Russia as part
of a pro-bono assignment that was conducted during April 1997

Vologda Dairy Industry

There is a long tradition of dairying in the Vologda Oblast, and a strong desire on the part of many, if not most, collective and private farm managers to continue in this endeavor. However, if dairy enterprises are to be successful (profitable) in the Vologda Oblast, these dairy farm managers cannot afford to be lax in management of the operations. Managers and private farm owners will need to take a business approach to managing the operations and, perhaps equally important, to plan for the operations to succeed without any government subsidies. Then, if subsidies do become available, that money can be used to enhance or expand the enterprise.

Farm managers have little control over the prices that they receive for their products, although quality premiums (high fat or protein, or low SCC) and marketing strategies (market "Vologda" milk directly in Moscow) would result in higher prices. Both of these efforts will take time to develop and implement, and some farms may not survive economically without more immediate action. These farm managers should focus on increasing output and cutting expenses to achieve and maintain profitable dairy enterprises.

The relatively modest milk yields, coupled with a gross excess of labor, accounts to a large extent for the low or negative profit margins. The following suggestions are meant to identify those factors that will have the greatest immediate impact on dairy farm profitability in the Vologda Oblast. These suggestions apply equally to the larger collective farms as to the smaller private farms.

1 **Optimize animal performance** (milk yield/cow and growth rates of replacement females)

Maintain and utilize individual animal reproduction and performance records to identify those animals who will make money for the enterprise. This will allow the lower-producing cows to be identified and culled, thereby increasing the genetic and productive level of the herd. The record keeping system does not need to be elaborate or expensive. The basic information needed for each animal includes

- Animal identification (brand, or ear notching) plus sire, dam, and date of birth
- Reproduction dates of estrus, inseminations (including sire used) and calvings
- Performance monthly recordings of yields of milk and milk components, and periodic growth rates (body weights and height at withers) of replacement heifers. Monthly milk yields can be plotted on standard lactation curve graphs to estimate individual animal performance. (See Graphs A, B, and C in the Appendix.)
- Health vaccinations, diseases, and treatments

Feed properly balanced rations to cows and replacement heifers in order to achieve optimal performance and animal health Both the overfeeding and underfeeding of nutrients will decrease profits and animal performance. Recommended nutrient content of diets for dairy cow and replacement heifers is shown in Table 1. Given the crops that can be grown in the Vologda Oblast, protein, rather than energy, is the primary nutrient limiting animal performance. Few high protein feeds are grown in the Oblast, thus emphasis must be placed on harvesting grasses when the protein content is still relatively high (see below). The impact of grass quality on maximum potential milk yields and feed costs, in terms of additional protein needed, is illustrated in Table 2. Comparable information for growing replacement heifers is shown in Table 3. Energy is not the primary nutritional concern, due to the availability of cereal grains and the fact that energy content of grasses changes only slightly as the grasses become more mature. Mineral and vitamin supplements are available, but currently are utilized only to a limited extent. These need to be supplemented to all animals for optimum performance and health.

Produce high quality milk with high levels of components (high protein and low SCC) Lower sub-clinical rates of mammary gland infection (measured by somatic cell counts (SCC) or leukocytes) will result in increased milk yields per cow. In general, each time the SCC level doubles (from 100,000 cells/ml to 200,000 cells/ml, or 200,000 to 400,000, 400,000 to 800,000 etc.), the milk yield will be reduced 0.5-1.0 kg per cow per day. Thus, a cow with a SCC of 800,000 cells/ml will produce 2-3 kg less per day than if she had a SCC of 100,000. Although the market does not pay a premium for milk with higher levels of components (e.g. protein and fat) currently, it may in the future.

2 Minimize expenses

Minimize labor costs by hiring as few workers as possible Currently, dairy farms in the Vologda Oblast utilize many more workers per cow (at the same level of automation) than comparable farms in the U.S. Most U.S. dairy farms, from small farms to very large farms, use an average of 1 worker for every 60 dairy cows (milking plus dry). This number of workers would work 40 hours per week and be responsible for milking, feeding, and clean-up of the cows, as well as caring for an equal number of replacements (heifers and calves). Additional workers would be required for harvesting crops and raising other livestock (such as male calves raised for meat). Herds that milk three times per day will have slightly more workers per cow than the average.

Emphasize production of high quality grasses in order to minimize the need for purchased protein concentrates Yields of 15 kg per cow per day are possible with high quality grasses and no supplemental cereal grains, protein or commercial concentrates (but still require mineral and vitamin supplementation). This represents peak yields and will be difficult to sustain as an average for the entire lactation. This would mean a daily average of 10-12 kg per cow for the entire lactation. The effect of stage of maturity at harvest on either percentage of nutrients per unit of dry matter or on total yield of nutrients per hectare are shown in Graph D ("Relative Yield of Grasses") and Graph E ("Relative Yield of Nutrients per Hectare") located in the Appendix of this report. Early harvest (late vegetative to early bloom stage) results in optimum yields of nutrients per hectare. Application of an additional 1 kg nitrogen fertilizer per hectare will increase yields of dry matter by 25-30 kg/ha. However, if other nutrients (especially P, K, Ca, Mg, and S) are limiting, yields will be reduced and the response to nitrogen fertilization will be small.

Minimize the number of replacement heifers by optimizing growth rates and age at first calving (AFC) Daily gains of 700-800g are possible and reasonable, but may require some purchased protein concentrates (refer to Table 3) Total cost to raise an animal from birth to calving is similar for an accelerated growth rate (calve at 24 months of age) that is achieved with feeding some purchased concentrates versus a high forage based feeding system that results in a lower daily rate of body weight gain and an average AFC of 30 months Earlier calving will result in a faster payback (recovery) of rearing costs, plus generate more net profit at any given age of the animal This difference is illustrated in Graph F in the Appendix Two other factors, the culling rate in the herd and the percentage of heifers that die before calving, will affect the total number of replacement heifers needed to maintain a constant herd size The effect of a 25% versus a 40% culling rate on the number of replacement heifers needed to maintain a constant herd size is illustrated in Graph G Multiply these numbers by 1 XX (where XX represents the death loss - e g with a 12% death rate multiply by 1.12) to adjust for death losses

Currently, the factor most responsible for limiting milk yields per cow is forage (grass) quality Most grasses fed have relatively low nutrient value due to over-maturity at harvest and spoilage during storage, whether stored as hay, haylage, or silage This reduced quality is caused by a combination of factors, such as weather, inadequate harvesting equipment, and poor storage condition Weather conditions in the Vologda Oblast make it difficult to field dry hay, thus haylage and silage are more suitable However, the forage harvesting equipment currently available makes the task of harvesting and storing high quality grass silage and haylage difficult on most farms The forage harvesting equipment is inadequate in two aspects (1) it does not have sufficient capacity or reliability to allow harvesting enough of the crop at the optimum stage of maturity, and (2) it does not have the capability of chopping the material short enough to minimize quality deterioration during storage

Finally, a dairy enterprise budget was developed in more detail than the one prepared by Kent Fleming (see example in Appendix) However, the wide variation in prices and costs that exist within the Oblast, and the difficulty in getting accurate information regarding some inputs make it difficult to draw conclusions from this budget The sample budget that is attached was developed by looking at the amount of milk that could be produced from just high quality grasses, with virtually no purchased commercial concentrates fed As with any dairy budget, the items having the greatest impact on profitability are milk yield, milk price, feed costs, and labor Currently, farm milk prices vary two-fold within the Oblast, from around 800 rubles/kg to nearly 1600 rubles/kg Since feed accounts for 40-50% of the total cost of producing milk, this should be a primary focus of the farm managers

Recommendations

If dairy farms are to be successful in the Vologda Oblast, the owners and managers need to learn to operate the enterprises as businesses, with careful attention paid to optimizing outputs and controlling costs Since feed is the single largest expense on a dairy farm, it is logical that this area receive the greatest attention Educational programs that focus on both production of high quality forages and development of nutritionally balanced rations are needed Once the managers learn how to produce high quality forages and balance the diets that they feed to their cattle, growth rates of replacement heifers and yields of milk should improve, thus improving profits The best approach would be to develop an interdisciplinary educational program that involves a forage production specialist, a dairy nutritionist, and a dairy economist

Table 1 Recommended nutrient content of diets for dairy cattle

Nutrient	units	Early Lactation	Mid-Late Lactation	Dry Pregnant	Calf Starter	3-6 mos *	6-12 mos *	> 12 mos *
<i>100% dry matter basis</i>								
Crude Protein (CP)	%	17	15	12	18	16	12	12
Undeg intake protein	% of CP	35	30	32				
Soluble protein	% of CP	32	30	32				
Crude Fiber	%	15	17	22				
Acid detergent fiber	%	19	23	30				
Neutral detergent fiber	%	28	34	42				
TDN	%	75	65	56	80	69	66	61
Net energy-lactation	Mcal/kg	1 72	1 47	1 25				
Net energy-maintenance	Mcal/kg				1 90	1 70	1 58	1 40
Net energy-gain	Mcal/kg				1 20	1 08	0 98	0 82
Fat, maximum total	%	5	3	3	3	3	3	3
Calcium (Ca)	%	0 72	0 70	0 60	0 60	0 55	0 42	0 30
Phosphorus (P)	%	0 45	0 40	0 30	0 40	0 35	0 30	0 25
Magnesium (Mg)	%	0 26	0 26	0 18	0 10	0 20	0 16	0 16
Potassium (K)	%	1 15	0 95	0 70	0 65	0 65	0 65	0 65
Sulfur (S)	%	0 22	0 21	0 16	0 20	0 20	0 10	0 10
Chlorine (Cl)	%	0 27	0 27	0 20	0 20	0 25	0 20	0 20
Sodium (Na)	%	0 20	0 20	0 10	0 10	0 18	0 10	0 10
Cobalt (Co)	ppm	0 4	0 3	0 3	0 1	0 1	0 1	0 1
Copper (Cu)	ppm	15	12	12	10	12	12	12
Iodine (I)	ppm	0 8	0 8	0 5	0 25	0 25	0 25	0 25
Iron (Fe)	ppm	100	100	100	50	50	50	50
Manganese (Mn)	ppm	60	50	60	40	50	50	50
Selenium (Se)	ppm	0 3	0 3	0 3	0 3	0 3	0 3	0 3
Zinc (Zn)	ppm	70	60	70	40	60	60	60
Vitamin A	1,000 IU/d	150	100	100	1000	1000	1000	1000
Vitamin D	1,000 IU/d	50	35	30	150	150	150	150
Vitamin E	IU/day	600	600	1000	15	15	15	15

* - Growing Heifers and Bulls

Table 2 Grams of supplemental crude protein (CP) needed with different forage qualities and levels of milk yield

Milk Yield (kg/day)	Grass Quality (g CP/100 g Grass DM)				
	16	14	12	10	8
	<i>g of CP</i>				
5	0	0	0	0	126
10	0	0	61	338	575
15	0	182	510	787	1024
20	239	631	959	1235	1473
25	687	1080	1407	1684	1922
30	1136	1529	1856	2133	2371

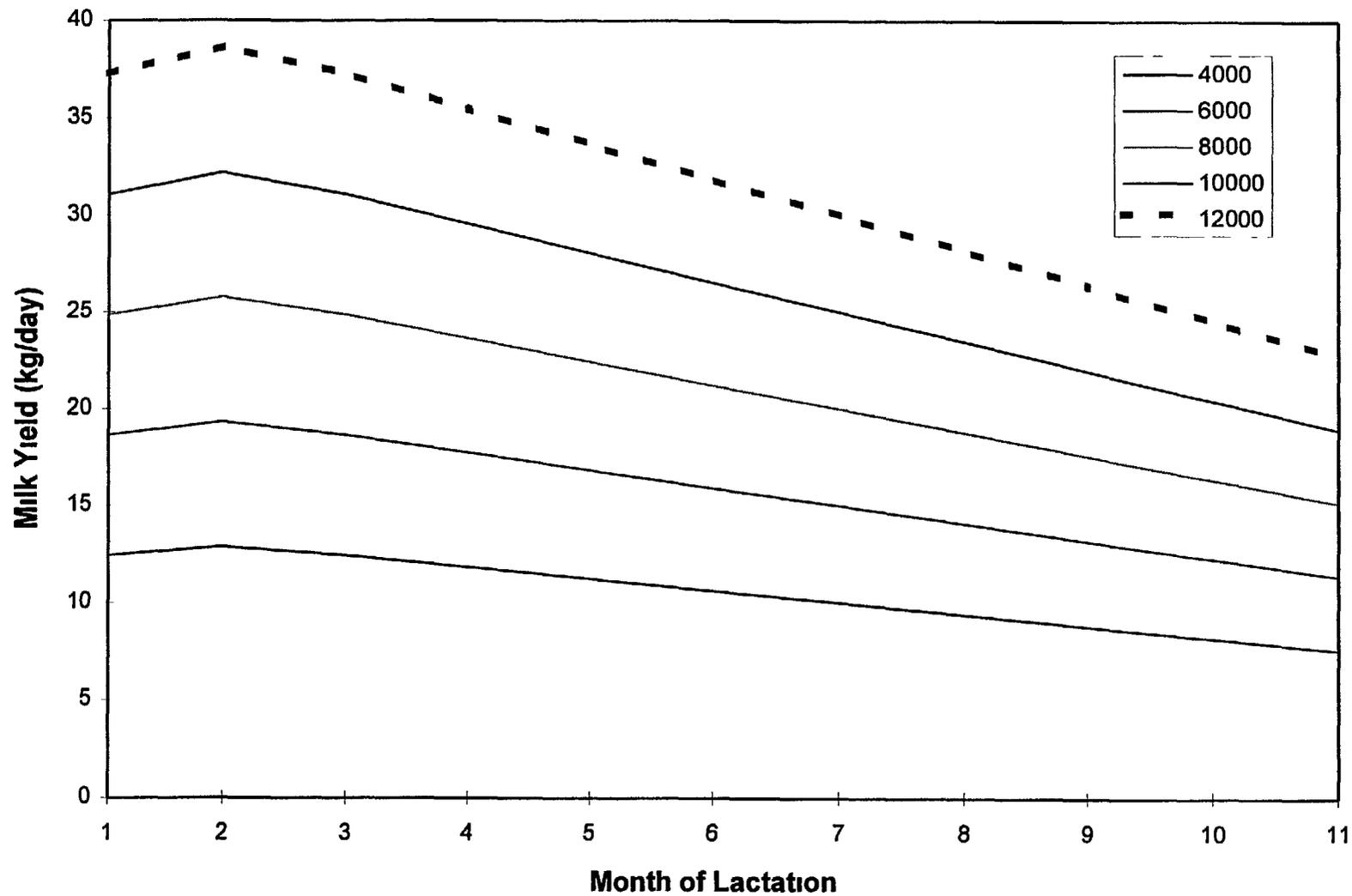
Table 3 Grams of supplemental crude protein (CP) needed with different forage qualities and rates of body weight gain of replacement heifers

600 g Body Weight Gram Per Day					
BW (kg)	(g CP/100 g Grass DM)				
	16	14	12	10	8
	<i>g of CP</i>				
100	37	116	181	236	284
150	0	104	202	285	356
200	0	20	151	262	357
250	0	0	37	175	294
300	0	0	32	198	341
350	0	0	34	228	394
400	0	0	47	269	458
450	0	0	71	320	534
500	0	0	111	388	625

700 g Body Weight Gram Per Day					
BW (kg)	(g CP/100 g Grass DM)				
	16	14	12	10	8
	<i>g of CP</i>				
100	68	147	212	267	315
150	24	142	240	323	394
200	0	75	206	317	412
250	0	0	78	216	335
300	0	0	79	245	388
350	0	0	90	284	450
400	0	0	110	332	521
450	0	0	144	393	607
500	0	0	195	472	709

800 g Body Weight Gram Per Day					
BW (kg)	(g CP/100 g Grass DM)				
	16	14	12	10	8
	<i>g of CP</i>				
100	99	178	243	298	346
150	063	181	279	362	433
200	0	130	261	372	467
250	0	0	126	264	383
300	0	0	128	294	437
350	0	0	145	339	505
400	0	0	175	397	586
450	0	0	218	467	681
500	0	0	280	557	794

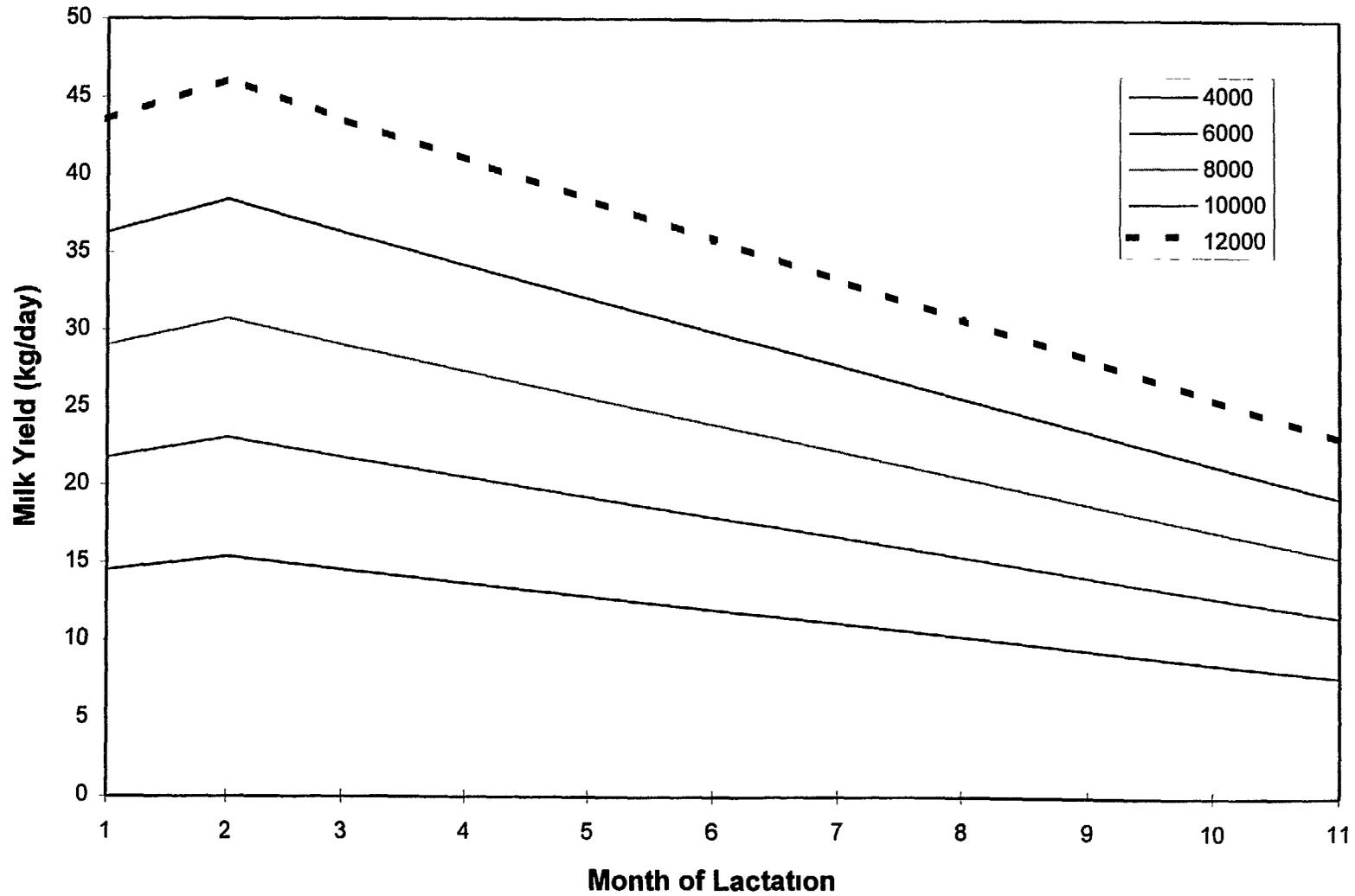
Lactation Curves for First Lactation Cows



Graph A

P

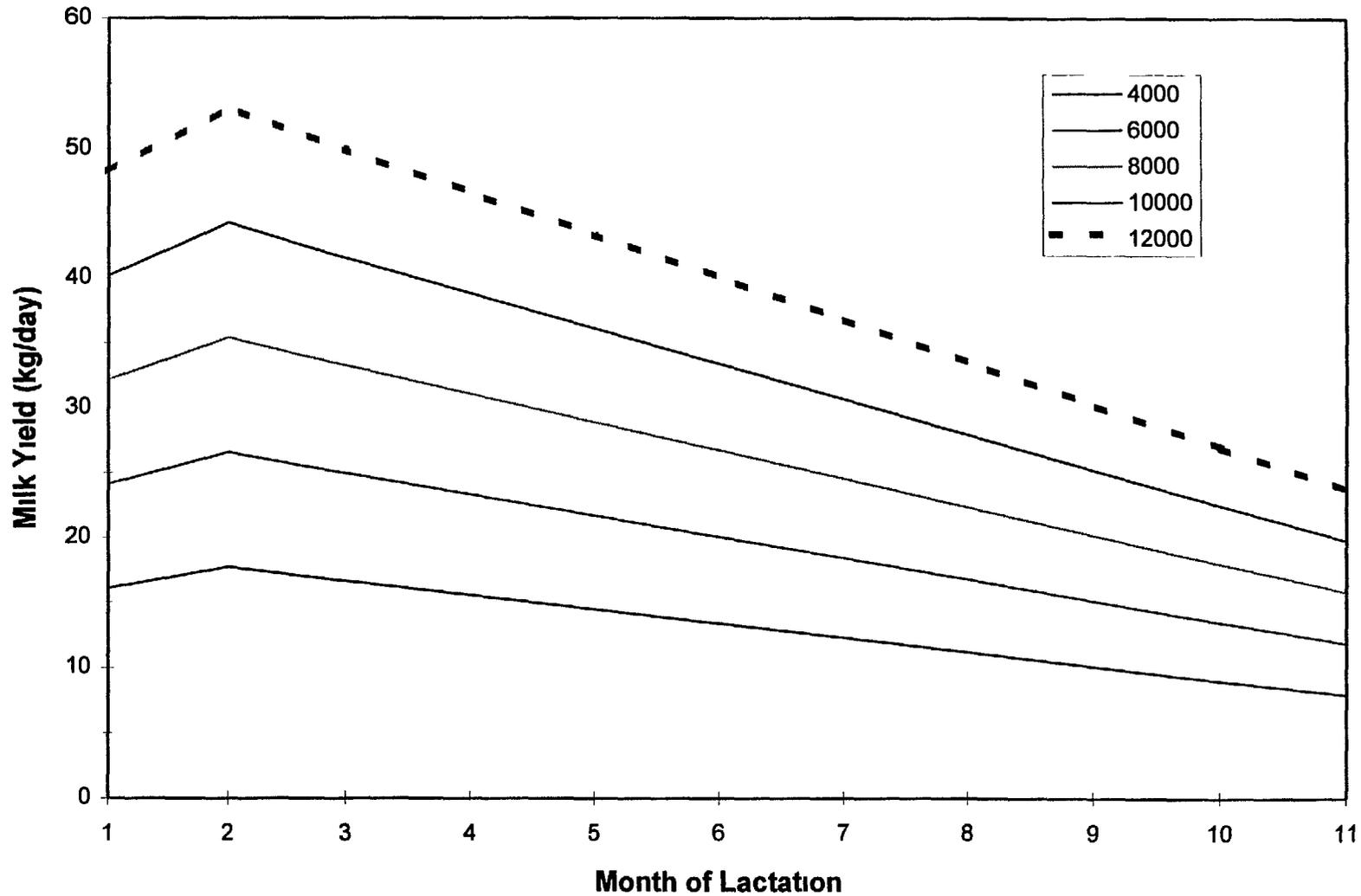
Lactation Curves for Second Lactation Cows



Graph B

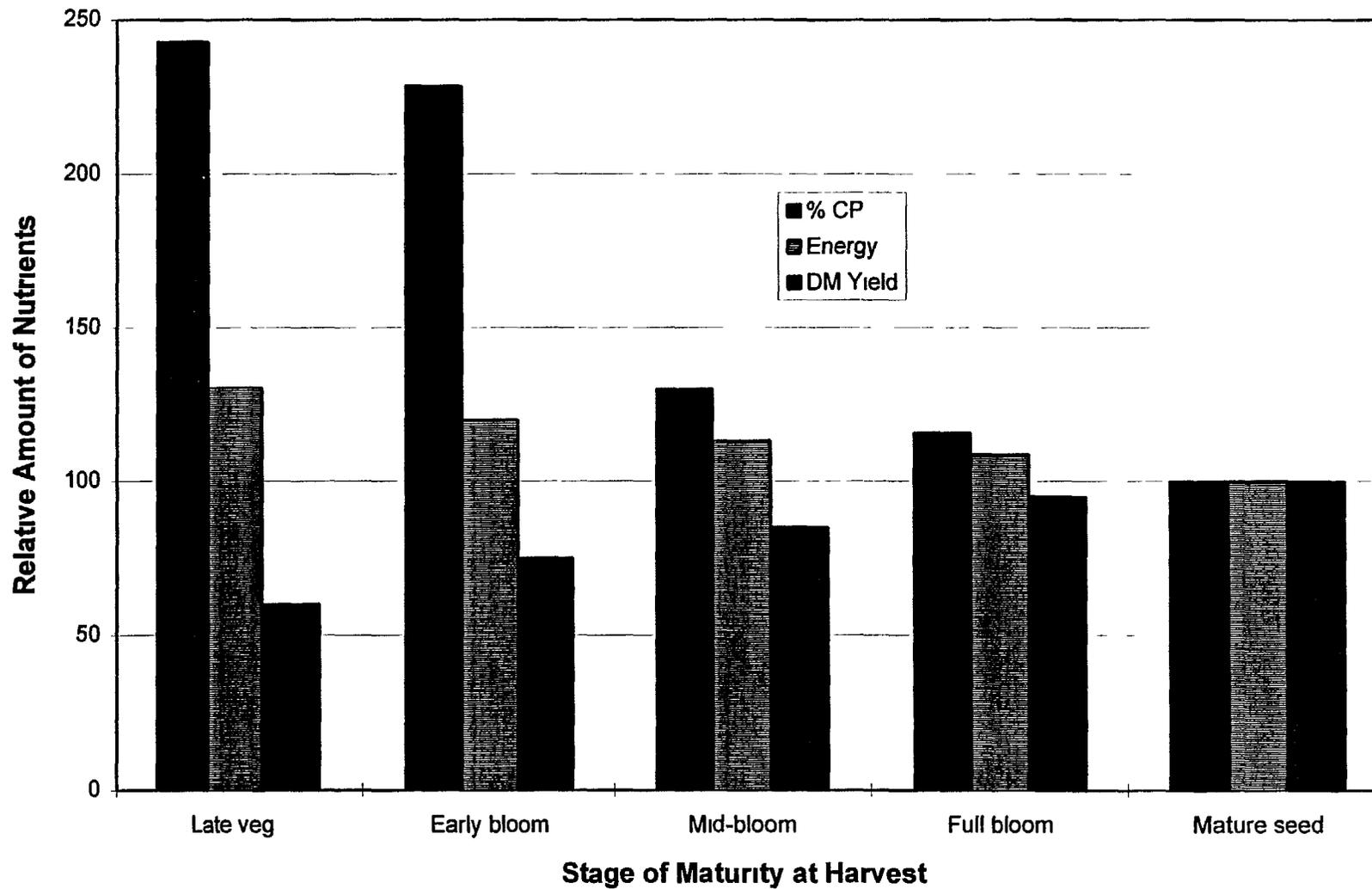
9

Lactation Curves for Third Lactation and Older Cows



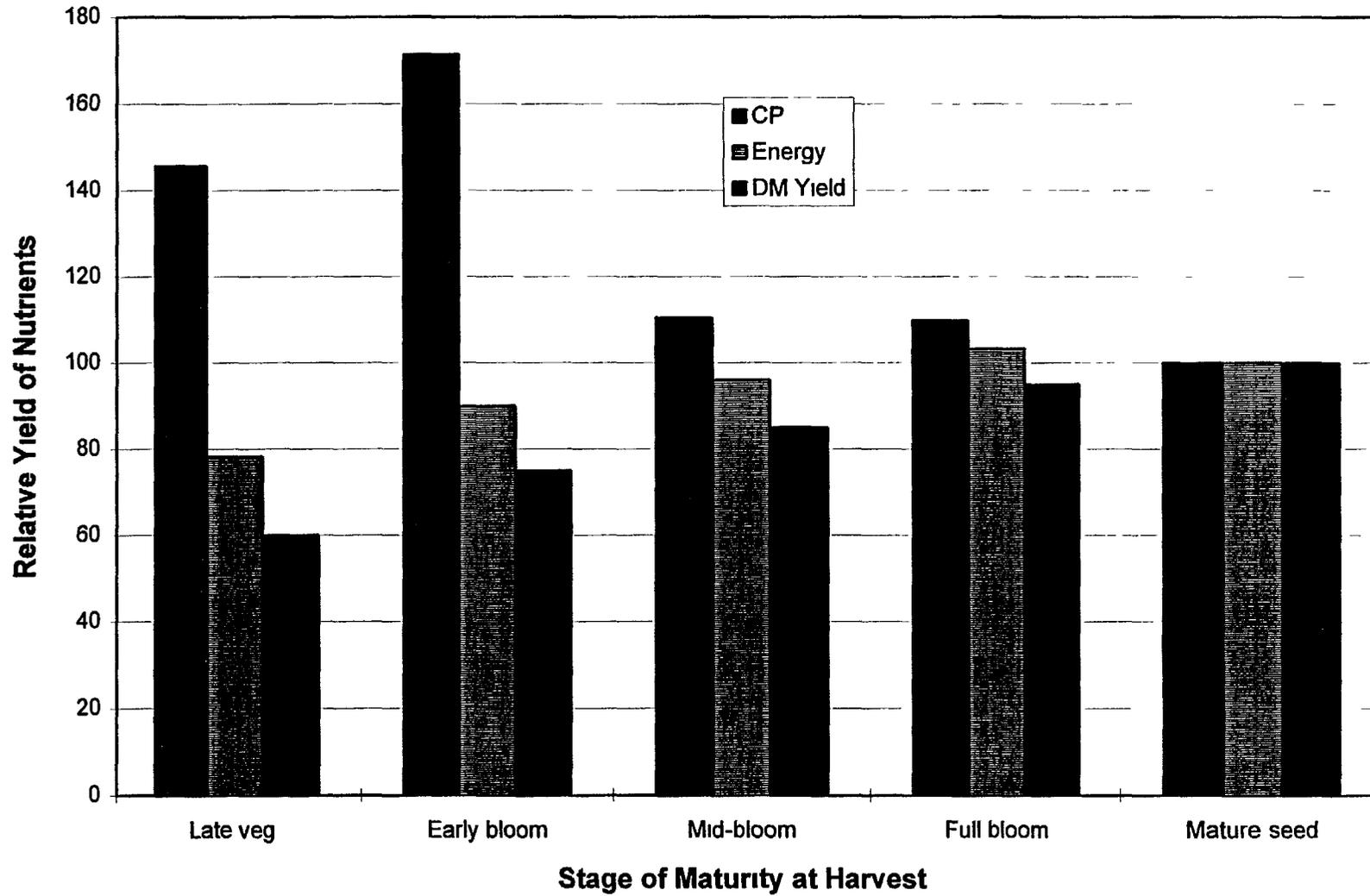
Graph C

Relative Yield of Grasses (Nutrients per Unit of Dry Matter)



Graph D

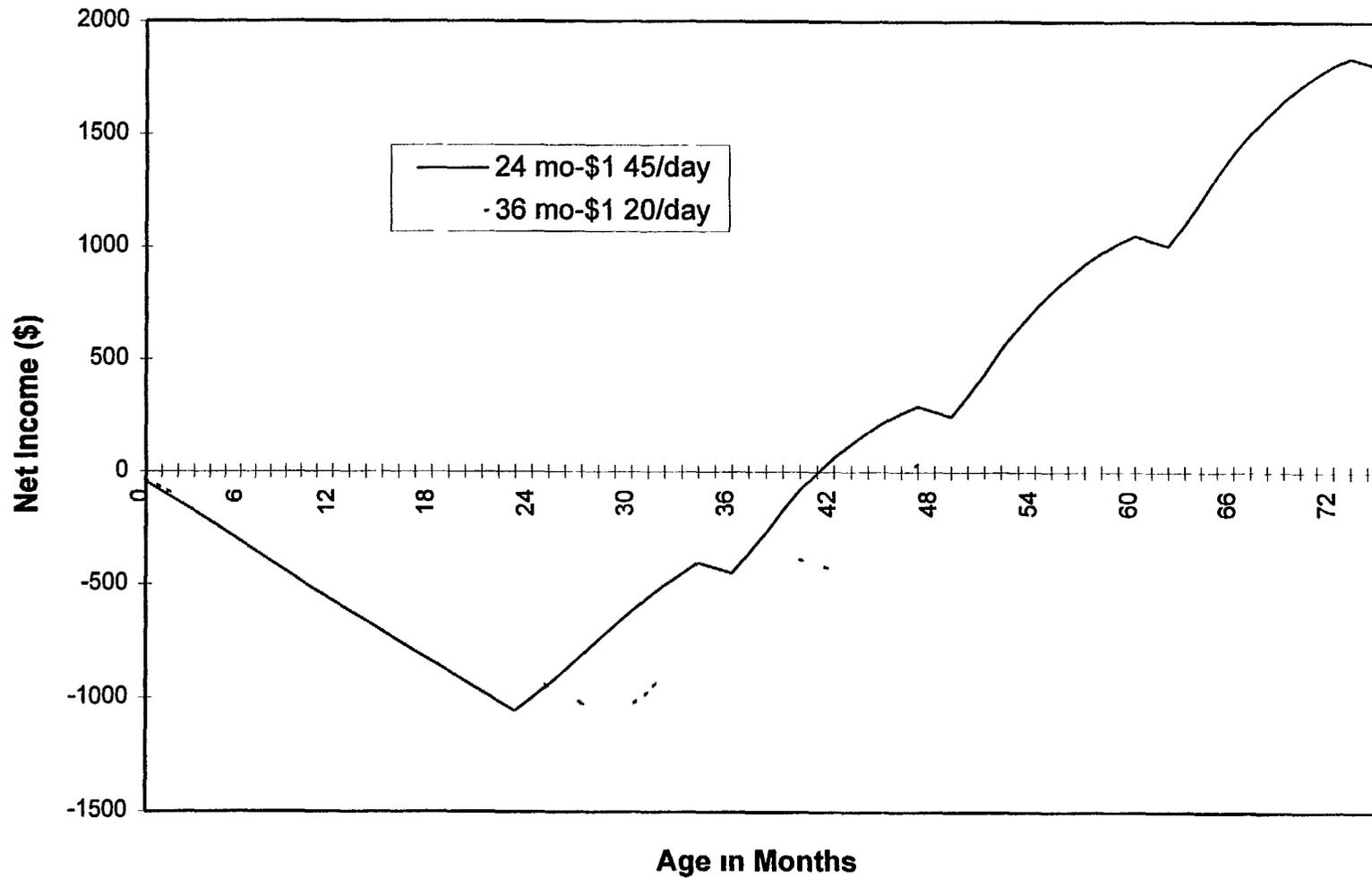
Relative Yield of Nutrients per Hectare



Graph E

2

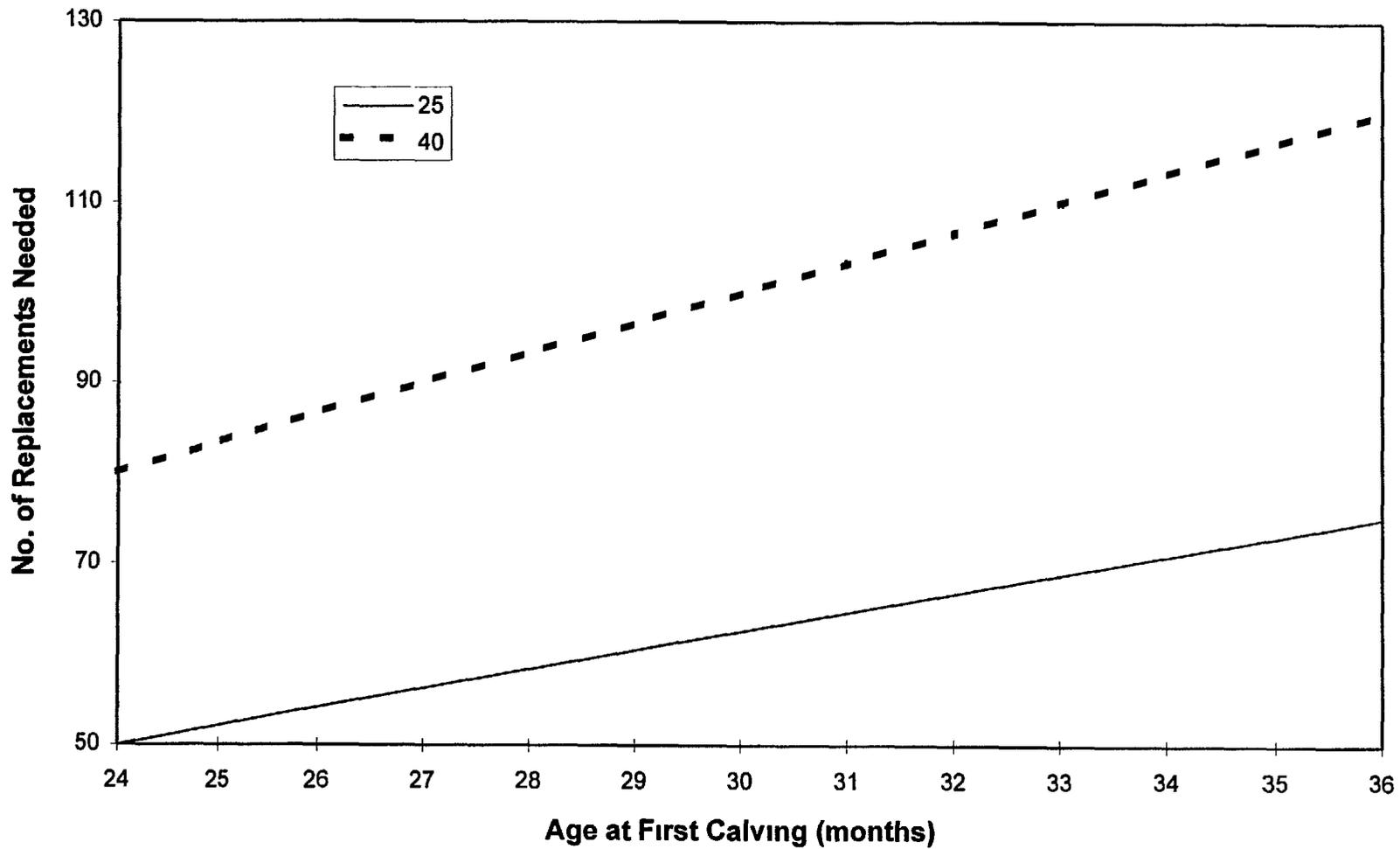
Cumulative Net Income of Heifers Calving at Different Ages and Different Rearing Costs



Graph F

13

Number of Replacements Needed to Maintain a Constant Herd of 100 Cows With Two Culling Rates and 0% Death Losses



Graph G

14

Dairy Budget
(all amounts times 1,000 Rubles)

Number of cows in herd =		120	25 cull %	Per Cow	TOTAL
		amount units	Price units	1 000 Rubles	1 000 Rubles
I RECEIPTS					
1	Milk sales	3500 kg	1 2 /kg	4200	504000
2	Cull cow sales	500 kg	1 85 /kg	231	27750
3	Calf sales				
	a bull calves	35 kg	6 /kg	105	12600
	b heifer calves				
4	Manure sales				
GROSS RECEIPTS				4536	544350
II VARIABLE COSTS					
A Feed costs (cows)		/cow/day	1 000 rubles	1 000 rubles	1 000 rubles
1	Hay	15 5 kg	300 /ton	1782	213854
2	Haylage		220 /ton		
3	Straw		130 /ton		
4	Silages and root crops		/ton		
5	Green feeds (pasture)		/ton		
6	Grass flour		/ton		
7	Cereal grains		/ton		
8	Protein supplements		/ton		
9	Minerals & vitamins		85 /mo	9	1020
10	Other				
Total feed costs for cows				1791	214874
B Feed costs (replacements)					
11	Hay	6000 kg/hd	300 /ton	900	108000
12	Haylage		220 /ton		
13	Straw		130 /ton		
14	Silages and root crops		0 /ton		
15	Green feeds (pasture)		0 /ton		
16	Grass flour		0 /ton		
17	Cereal grains	532 kg/hd	1000 /ton	266	31920
18	Protein supplements	77 kg/hd	2300 /ton	89	10626
19	Minerals & vitamins	49 kg/hd	500 /ton	12	1470
20	Milk /milk replacer	450 kg/hd	1 2 /kg	270	32400
21	Feed cost/mo if AFC>24 mo	30 mos AFC		85	10233
Total feed costs for replacements				1622	194649
12 Total feed costs (all animals)				3413	409523
C Non feed costs				1 000 rubles	1 000 rubles
1	Vetennary & medicine		1080 /mo	108	12960
2	Breeding	4 amp/co	4 8 /ampule	19	2304
3	Electricity & fuel		2000 /mo	200	24000
4	Water		2000 /mo	200	24000
5	Supplies (eg soap inflations)		100 /mo	10	1200
6	Bedding	3 5 ton/m	5 /ton	2	210
7	Labor - milkers (incl benefits)	2 F T E	14400 each/yr	240	28800
	- seasonal (incl benefits)	2 F T E	12000 each	200	24000
8	Dairy services (eg equip maintenance)				
9	Other services (eg accounting)		1000 /mo	100	12000
10	Total livestock cost			1079	129474
11	Operating capital interest	6 mo	16 5 %	89	10682
12	Total non-feed costs			1168	140156
TOTAL VARIABLE COSTS				4581	549678
III FIXED COSTS			1 000 rubles		
1	Dairy cow			52	6240
2	Dairy machinery & equipment			143	17174
3	Dairy buildings			61	7286
4	Death loss	0 4 %	1000 /cow	4	480
TOTAL FIXED COSTS				260	31181
IV TOTAL COST (except management & unpaid labor)				4840	580859
V RETURN TO MANAGEMENT				304	36509