

slaughter would have to be up in excess of 20 percent, at around 47 million head. Increases of this magnitude seem highly unlikely unless widespread drought conditions reoccur again next

year. Continued sharp increases in calf slaughter for the remainder of 1974 and on into 1975 could jeopardize cattle slaughter supplies of 1976.

The Present and Future for Dairy Production

Robert E. Jacobson, Ph.D.

Professor, Dept. of Agricultural Economics

The Ohio State University

2120 Fyffe Road

Columbus, Ohio 43210

In accepting this assignment, one question kept cycling back to me as I considered what dimensions of the dairy outlook to emphasize. That question was "Why? - Why are the veterinarians concerned with the future of dairy production?" You can probably specify better reasons than I can, but here are a couple.

1. Since the livelihood of many of you is pretty closely related to the size and location of the dairy industry, the future of milk production is obviously pretty close to your own vested interest.
2. The problems and the emphasis in research and practice that come to your profession are partly influenced by what is happening in the milk industry. Therefore, as you as a profession plan for the future, you require a perspective on key trends across the milk industry.

Initially, I'd like to make the assumption that we are talking about dairy production and the dairy industry only in the United States. But to make that assumption, I believe that we need a quick overview of where the U.S. milk industry stands relative to the rest of the world.

In this year of 1974, we will be producing almost exactly 115 billion pounds of milk in this country. That happens to be just about 15 percent of the nearly 772 billion pounds of cow's milk that will be produced in the major dairy countries around the world this year. We can note in passing here that cow's milk accounts for about 90% of the world's milk supply, with sheep, goats and some other species producing the remainder.

In the early 1960's about 20% of the world's milk supply was produced in the U.S. but two shifts have occurred in this past decade:

1. U.S. milk production has dropped by about 9%.
2. World milk production has increased by about 20%.

Today, Russia ranks as the world's No. 1 milk producing country, contributing 26% of the world's supply. We are easily in second place and France

(9%) is a distant third. However, a number of countries that do not produce a great volume of milk do in fact produce a lot more than they can handle in their own domestic markets; these countries include several West European nations, New Zealand, Australia, and to some extent Canada. This complicates commerce in dairy products somewhat. Most countries that have dairy products to export also have price support programs in effect to protect producer milk prices. This, in turn, means that these countries, such as France and Ireland, have high consumer prices for milk products in their own countries but must provide export subsidies to move their surplus product into foreign trade. This is where the trade issue gets sticky. U.S. milk producer interests get up-tight pretty quick when relatively low priced imports come in and erode what they consider to be their markets. That is why we currently hear talk about countervailing duties. The question is, "Why should we be a dumping ground for somebody else's surplus?"

It's hard to come up with a soothing answer to that question, of course. Actually, we have pretty rigid import quotas on milk coming into this country. These are called Section 22 quotas. The rationale for Section 22 quotas is that when there is a price support program directed to a commodity, and we have a milk price support program, then it doesn't make sense to undermine the purposes of that program by permitting unlimited imports. So we have annual quotas on imports of dairy products. In most recent years, imports of dairy products into this country have only amounted to 1.5% of our total milk supply, simply because quotas have held them down to that level. Of course, there was a spurt of imports in 1973 (up to 3.5% of our supply) and this has generated a lot of reaction across the dairy industry. Initially, quotas were relaxed in 1973 and early 1974 because of a serious shortage of milk solids in this country; but ultimately, the imports of cheese and nonfat dry milk were a prime factor in the serious break in producer

milk prices this past spring and summer. I have dwelled on this international dimension to some extent because, as we look to the future, if our domestic milk production adjusts downward somewhat, the import question will be in front of the dairy industry on a continuing basis.

There was one curious footnote on the imports of nonfat dry milk this past year that may be of interest to veterinarians. In the big surge of imports of nonfat dry milk, some of that product came in from countries not free of hoof and mouth disease. As a result, we had imported powdered milk that could be used for human consumption, but could not be used as an animal feed. That's a tough one to have to explain to the public.

A second element of perspective as we look to the future of milk production concerns how we utilize the milk supply that we have. It is helpful to know how we use our milk supply because that is an indicator as to (1) whether we either have to increase milk production to take care of fluid requirements or (2) whether there is room to let milk production slide because so much milk is used for manufactured dairy products which we could procure elsewhere. In fact, the utilization of the U.S. milk supply in 1950 and 1974 shows the following profile:

Table 1
Utilization of U.S. Milk Supply, 1950 and 1974

	1950	1974
U.S. Milk Production	116.6 Bil. lbs.	115.1 Bil. lbs.
Utilization:*		
Fluid	43%	45%
Butter	28%	17%
Cheese	12%	22%
Ice cream products	7%	10%
Other	10%	6%

*In 1950, farmers sold only 84.3% of milk produced. In 1974, farmers sold 97.2 percent of milk produced.

As the data indicate, the proportion of milk used for fluid purposes has not changed much over this past generation. Within the manufactured dairy products area, we see a major de-emphasis in butter production and a major increase in cheese production. Obviously, the substitution of margarine for butter and the move to a record cheese consumption of 14 pounds per capita this year explains this shift.

But the point finally comes down to the fact that a little less than half of our national milk supply is used for fluid purposes. As a matter of national policy, we are committed to having an adequate supply of milk produced in this country. Both the dairy price support program and the Federal milk marketing order program emphasize the criterion of "adequate supply" in determination of the annual price support and in establishing the level of class prices in fluid milk markets. But what is an adequate supply of milk for this nation's consumers? We'll hear this question more and more in these next few years as we debate

whether we must meet our total dairy product requirements, which defines the present system, or whether the dairy industry should be geared primarily to service our requirements only for fluid products and for the so-called soft dairy products (cottage cheese, ice cream, yogurt, etc.).

A third element of perspective concerns the move to total conversion to Grade A milk production in this country. As recently as 1950, only 61% of the milk marketed in the U.S. was of Grade A quality. But by 1973, the proportion of all milk that was Grade A milk had increased to 78%, and the trend to Grade A is continuing. Most of the Grade B milk that is left in the country is produced in the North Central States. In fact, Wisconsin is only 59% Grade A, and Minnesota is only 39% Grade A, so that these two states alone account for slightly over half of the manufacturing grade milk that is marketed. Most observers, including those in Wisconsin, now conclude that we will be fully converted to Grade A milk sometime between 1985 and 1990.

When we look to the total cattle industry, including dairy plus beef, it's fascinating to look at the changes that have been taking place in recent years. Note the data in Table 2.

Table 2
Cattle and Calves on Farms, U.S.,
1950, 1965 and 1974

	Milk Cows, Heifers that have calved and milk cow re-placements	Beef Cows, Heifers, Calves, Steers, Bulls, all for beef	Total Cattle	Pct. Dairy of Total
1950	28,945,000 hd.	49,018,000 hd.	77,963,000 hd.	37.1%
1965	20,160,000 hd.	87,743,000 hd.	107,903,000 hd.	18.7%
1974	15,227,000 hd.	112,313,000 hd.	127,540,000 hd.	11.9%

Some obvious things appear in this data. First, the total cattle population in the U.S. increased by 64% from 1950 to 1974, reaching a total head count of 127.5 million this past January 1. Meanwhile, the proportion of cattle identified with the dairy industry was dropping from three animals out of every eight back in 1950 to only one animal in eight at the present time. The number of beef cattle more than doubled from 1950 to 1974 while the national dairy herd was reduced by nearly one-half. Significantly, however, total milk production in the U.S. in 1950 and in 1974 were nearly identical.

Let me turn now to some comment about milk production on a regional basis in the United States. First we can note that milk production attained its all time record in the U.S. back in 1964 when it totaled 127.0 billion pounds. Milk production has backed off unevenly from that level in the 10 years since, and 1973 production of 115.6 billion pounds reflected a decrease of 8.7% from the 1964 record.

The recent 10 year adjustment has varied widely in the different production-marketing regions of the United States. For analysis purposes, the U.S. Department of Agriculture identifies 11 different milk production regions around the country. Let me briefly comment on (a) what proportion each region

contributes to total U.S. production, and (b) what has happened to milk production in each of these regions in the past 10 years. Remember, as we note regional adjustments, that U.S. production decreased by 8.7% during this period.

1. Northeast - The 11 states in the Northeast region are the second most important milk producing region. In 1973, these states accounted for 19.7% of U.S. milk production, but had dropped by 11.4% in the past decade, slightly faster than the U.S. average drop.
2. Lake States - Only three states are in this region, Michigan, Wisconsin, and Minnesota, but they alone accounted for 28.1% of U.S. milk production in 1973. In the past decade, they have dropped in production by 10.4%.
3. Corn Belt - Ohio joins with Indiana, Illinois, Iowa and Missouri in the five Corn Belt States and the third most important milk producing region at 14.3% of the U.S. total. However, milk production has dropped in the Corn Belt since 1964 by a remarkable 26.9%. Two key factors help explain this adjustment: (1) shift to other farm enterprises, particularly grain, beef and hogs, and (2) ready availability of alternative milk supplies from the nearby Lake States.
4. Northern Plains - Four states in the upper plains account for 4.9% of the U.S. milk supply and have had a substantial 18.8% production decrease since 1964.
5. Appalachian - The five Appalachian States - both Virginias, North Carolina, Kentucky, and Tennessee - produced 6.8% of our milk in 1973 and have dropped by 7.2% in milk production in the past 10 years.
6. Southeast - The four Southeastern States produced only 3.7% of the nation's milk in 1973 but had a very notable 18.8% increase in production since 1964. The increase is primarily associated with a rapid population growth in the Southeast, especially Florida. As a consequence, milk production has increased to satisfy fluid market requirements.
7. Delta States - The three Delta States produce only 2.4% of our milk and have almost held their milk production level this past decade (-2.7%).
8. Southern Plains - The Southern Plains region includes only Oklahoma and Texas. They produce 3.8% of our supply and have increased by 3.7% since 1964.
9. Mountain - Our sparsest milk production region is located in the eight Mountain States - from New Mexico to Montana. They give us only 4.3% of our supply, but have stepped up their production level by 8.5% these past 10 years.
10. Pacific - The three Pacific States are an important producing region - California ranks second behind Wisconsin - and they give us 11.8% of our supply. They have increased in milk production by 19.2%, more than any other region, this past

decade. As in the Southeast, the production surge has followed the population surge.

11. Alaska and Hawaii produce a total of about 150 million pounds of milk annually and have dropped slightly in recent years.

We can now turn to the basic purpose of this presentation, and that is to estimate future milk production in the United States. To do that, it makes sense to look at the two basic factors that explain milk production—number of milk cows and production per cow.

Let me preface my remarks on these trends by emphasizing that what happens to milk cow numbers in the next 10 years will be greatly influenced by (1) feed prices, and (2) beef prices. A good illustration of this occurred in 1973. Milk production in this country dropped by over four billion pounds in 1973. Clearly, high feed prices and high beef prices had more to do with this decline than anything else. We have always known that feed costs and the milk-feed price ratio were important considerations in the milk production sector. After all, we generally impute 50% of the cost of producing milk to the cost of feed. But the impact of high feed costs never had the impact that it did until beef prices moved to record highs at the same time. In August, 1973, the milk-feed price ratio plunged to its lowest point in many years at the same time that cull cow prices averaged over 38¢ a pound at Omaha. In three months in 1973, from June to September, we lost 120,000 milk cows from the national dairy herd—an annual rate loss of over 4%. And of the cows in production, the production per cow dropped off as the rate of concentrate feeding was reduced.

We know that feed costs and beef prices separately have an impact on milk production. But when feed costs and beef prices simultaneously move to unusual levels, the impact on milk production is powerful. In this fall of 1974, we are seeing an upturn in milk production, in spite of high corn and meal prices, simply because the price for cull cows is so bad that there is no incentive to ship them. Feed prices are working against milk production, but beef prices are working for milk production. I have made some note of feed-beef effects because as we look ahead 10 years, we need to make some assumptions. The key assumptions I have in mind are that (1) feed prices will be relatively high, and (2) beef prices, in spite of their present plight, will be relatively high.

Milk Cow Numbers: we all know that the number of milk cows in the U.S. has been declining for many years. Actually, we peaked late in World War II (1944) at 25.6 million head. Milk cow numbers have decreased every year since then except the single year 1953, and our 1974 count is at 11,160,000 head, 44% of the number three decades ago.

Note the following average annual percentage changes in cow numbers.

1. From 1950 through 1974, we lost milk cows at an average annual rate of 2.66%.
2. From 1964 through 1974, we lost milk cows at an

annual average rate of 3.33%.

- From 1970 through 1974, we lost milk cows at an annual average rate of 1.94%.

The obvious purpose in looking at these attrition rates is to judge how well they will predict the future. It is said that the past is prologue, and, for better or worse, we have to rely on past evidence to predict future change.

One fair assessment, given the assumptions about feed prices and beef prices, and looking to the year 1985, is that cow numbers will decrease at an annual average rate of 2.5% between now and then. You can argue 2% or you can argue 3%, but given our recent history, a minus 2.5% rate looks pretty persuasive. If this rate prevails, we will have 8,446,000 milk cows in our national dairy herd in 1985.

Production Per Cow: production per cow in the U.S. in 1974 will reach a record 10,318 pounds. The volume per cow has doubled since the late 1940's. The news item this past week about a Holstein in Pennsylvania attaining 50,000 pounds in its current lactation period suggests that the end is not in sight. In only one year since World War II has production per cow failed to increase, and that was last year—1973—when feed costs and quality were an obvious interference.

Note the following average annual percentage changes in production per cow.

- From 1950 through 1974, production per cow increased at an annual average rate of 2.81%.
- From 1964 through 1974, production per cow increased at an annual average rate of 2.45%.
- From 1970 through 1974, production per cow increased at an annual average rate of 1.81%.

I suppose that genetics, nutrition, and management probably explain these increases, and probably in that order. And I suppose that another factor simply is the rather systematic culling overtime of the lower producing cows. But again the question relates to the future.

Obviously, if we assumed an annual average production per cow increase of 2.5%, we would conclude that milk production in 1985 would equal current production, simply because we have already assumed a decrease in cow numbers of 2.5% annually.

My assumption on production per cow is as follows: production per cow will increase at an annual average rate of 2.0% from 1974 to 1980 and at a rate of 1.5% from 1981 through 1985. It is not easy to defend this assumption other than to say (1) it looks consistent and maybe conservative relative to production per cow increases in recent years, (2) the same potential for per cow increases due to culling of inferior cows will not exist in the future as it has in the past, and (3) at higher levels of production per cow, given percentage increases mean higher absolute increases. One is tempted to back off of increases that exceed 250 pounds per cow per year.

If we accept the total rationale so far, we see 1985 as a year that has (1) a national dairy herd of 8,446,000

cows, and (2) production per cow at 12,517 pounds. And if we do the multiplication on this, we get a U.S. milk production estimate of 105.7 billion pounds. This would reflect an 8% decrease from 1974 production of 115 billion pounds. Obviously, the assumptions that have been made in getting at this estimate are crucial, and they are also arguable. But I believe a strong case can be made for the fact that the rate of decrease in cow numbers will exceed the rate of increase in production per cow over the next 10 years in this country, and that will mean some reduction in total milk production.

A word about the structure of the milk production sector will also be useful. We've seen substantially increased concentration in dairy farming in recent years. Most of this news comes to us in terms of producers getting out of business. In fact, the reduction in the number of farms in the United States having milk cows is an eye-opener. The Census of Agriculture showed that the number of farms with milk cows decreased from 1,792,000 farms in 1959 to only 650,000 in 1969, and of those 650,000, only about 400,000 actually sold milk. Presently, it is estimated that less than 300,000 farms sell milk in the United States.

The federal milk order program provides the best current structure information. Most of the Grade A milk (77%) in the U.S. is accounted for in this program. In fact, 60% of the nation's total milk supply is monitored in this program, and only 141,000 farms supply this milk.

The size of these Grade A dairy farms has increased steadily as measured by average delivery per day per producer. In 1955, the average daily farm shipment was 420 pounds; by 1965 it had reached 944 pounds; and last year the daily farm shipment averaged 1,379 pounds. Thus, Grade A dairy farms have more than tripled in size since 1955. Of course, the size of farm ranges widely in different markets. In 1973, the Duluth-Superior market showed the smallest size dairy farm at 911 pounds daily, and, not surprisingly, the 110 farms supplying the Miami, Florida, market averaged nearly 23,000 pounds in their daily shipment.

Again, our question concerns the future. Most management people report that there generally aren't significant economics of scale in milk production beyond a two to three man operation. Further, a nominal ratio of one man to 40 cows can be assumed. Except in atypical situations such as Miami and Los Angeles, problems with labor, disease, manure handling and the like will put limits on enterprise size. Sure we'll see more concentration, but then, as an average, we're still a long way from two-man operations, much less three-man. There will be more so-called cow factories in 1985 than now, but they certainly will not describe the milk industry.

Finally, a word about the market. My comments have been limited to production. This implies that we can assume the market, or demand, in these next 10

years. I think we can. Per capita consumption on a milk equivalent basis was 542 pounds in 1974. This level has dropped over the years, primarily because of decreases in butterfat consumption. But the demand situation for many dairy products is strong - low fat milk, hard cheese, and ice cream - ice milk in particular. Even butter consumption increased in 1974 (to 4.2 pounds per capita) as margarine prices moved up. The demand side of the market will generate prices related to the supply estimates discussed earlier.

Let me summarize by noting the following four points.

1. U.S. milk production will reflect some downward

adjustment over the next ten years.

2. By 1985, the dairy industry will no longer have a Grade A side and a Grade B side but will be almost completely converted to Grade A.
3. Regional shifts in milk production will continue to occur. We will see more milk produced where population growth is dynamic, and we will see less milk produced where the mix of agricultural resources favors alternative enterprises.
4. Decreasing numbers of dairy farms and increasing herd size will continue to describe the dairy sector. But if our average herd size today is 40 cows, we obviously have a long way to go before we lose the family farm identification in milk production.

Veterinary Medicine's Role in World Health and Food Production

Harold B. Hubbard, D.V.M., M.P.H.
*Regional Adviser, Veterinary Medical Education
 Department of Human and Animal Health
 Pan American Health Organization
 World Health Organization
 Washinton, D.C.*

Introduction

With your permission I would like to reverse the order of this presentation and we will discuss food production first. I choose this change principally because it follows more realistically the preceding speakers and in view of the recently held World Food Conference in Rome, food production is a vital constituent of improvement of human health in the world. Also many of the veterinary medical aspects of public health involve the food producing animals.

The information presented here will be limited to the Americas because of the extensive programs of the PAHO in this field.

In the region of the Americas, animal diseases represent some of the major problems of human and animal health significance that greatly affect food production.

Protein of Animal Origin

Production. Since protein of animal origin has a higher nutritional value than plant substances and considering the maintenance and improvement of its production remains our responsibility, let us limit our discussion to that type of food. Although the four major elements (LWEF), land, water, energy, and fertilizers, are directly involved in animal production, it will be advantageous at this time to leave those giants to the giant killers: the politicians.

Considerable information regarding food consumption and nutritional needs of the people of Latin

America is available (1,2). It may be reasonably concluded that in most countries of Latin America and the Caribbean area mortality in children between the ages of one and four is from 10 to 33 times greater than in the developed countries. Reports indicate that nutritional deficiency has been associated with 70 per cent of all deaths from infectious diseases. Were this not the case, that is to say, if protein-calorie intake and maintenance were at adequate levels—a child would have a chance of surviving equal to that of his counterpart in a developed country.

Recent figures show that the average annual rate of population increase in Latin America is 2.9 percent—the highest in the world. Yet, as the population growth accelerates rapidly, overall food production is declining. In some countries one farmer can feed himself and 29 other people, while in Latin America the average farmer is able to feed only himself and 6.5 others (4). Reversal of this trend must be accomplished with technology and efficient agricultural production through scientific exploitation of the land.

Very little relief can be expected from the work that has been done with new wheat varieties as a solution to the food problem, since it applies mainly to temperate regions. The development of technology for the basic food crops of the tropics has been limited and slow.