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**A STUDY OF THE DIFFERENCES BETWEEN
POUNDS OF MILK PRODUCED AND POUNDS OF
MILK SOLD PER COW ON NEW YORK DAIRY FARMS,
1977 AND 1978**

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Foreward

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Two measures of the rate of production of dairy cows have come into common use in dairy farming. These are the pounds of milk produced as used in the Dairy Herd Improvement production records, and the pounds of milk sold as used in the Dairy Farm Management Business Summaries. It is important that the differences between these two measures be recognized and understood. The purpose of this study was to determine the amount and nature of these differences as found on operating dairy farms.

A few studies of this subject had been made earlier. This report updates and elaborates on a study made for the year 1963. In this investigation some of the farm characteristics and business factors that might be related to the differences found between the two measures were also examined. This information should be of use to dairymen and those who work in various ways with the dairy industry.

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Introduction

Rates of production have long been recognized as one of the more important business factors that affect farm incomes. On dairy farms the production per cow is a key factor and is usually expressed in 'pounds of milk per cow'. This measure is used in discussions of dairy herd management and in dairy farm business management analyses. Both dairy farmers and those working with dairymen use this measure of "pounds of milk per cow" in many ways.

Over the years two common measures of "pounds of milk per cow" have emerged. The first is "pounds of milk produced per cow" as used in the Dairy Herd Improvement (DHI) records and the second is "pounds of milk sold per cow" as used in Farm Business Management records (FBR). These are both acceptable measures but they are different even though similar. Many times these measures are used interchangeably or the term of "milk per cow" is used without identifying whether it is "milk produced" or "milk sold". There is a difference, and it is this difference that gave rise to this research effort.

A farmer or an agribusiness person working with a farm family can be misled if they do not recognize the two different measures or use them incorrectly. For example a herdsman may be setting production goals for his herd and doing it in light of the DHI figures published in the local Extension News but then he tries to measure his achievement by using the information on "milk sold" as shown on the milk check statement. The goal in this case was based on "produced" figures while the accomplishments were based on "sold" figures. Similarly if an agribusiness person in budgeting for repayment schedules uses the "produced" rather than the "sold" figures they will find their budgets to be considerably short. When a dairyman is bidding on a cow at a sale it is important that he know whether the production quoted is the produced or the sold figure. If they are the produced figures, how can he readily adjust them to the sold figures? These are only a few examples of where and how it is helpful to know the differences between "milk produced" and "milk sold" measures of rates of production.

Purpose of Study

The purpose of this study was to investigate and clarify the differences in two common measures of rates of production used in relation to dairy farms namely "pounds of milk produced per cow" and "pounds of milk sold per cow".

Research Methodology

Two sources of dairy management information for individual farms are available and used for research purposes at Cornell University. The first is the Dairy Herd Improvement (DHI) records available in the Department of Animal Science. These provide much information on herd management practices and the production per cow as determined from weights taken once each month by a DHI supervisor or by the farmer. This information is entered into the computer and herd averages for the year are computed. The second source is the Farm Business Management Records (FBR) assembled each year in the Department of Agricultural Economics where the information is entered into the computer and various business management factors are calculated.

For the 1974 business year a project was initiated whereby the farms in both the DHI data bank and the FBR bank were matched and selected factors from the two sources were merged on computer tapes for research use. The data for each year since 1974 have been merged in a similar way.

The DHI data reports the average pounds of milk produced per cow per year for the herd as determined from the twelve monthly samples taken and the formula used to calculate this measure. This is recognized as a "produced" measure. The FBR data on the other hand reports the average pounds of milk sold per cow per year for the herd as determined by the total pounds of milk sold to the milk plant and the average number of cows for the year. This is recognized as a "sold" measure.

For each farm on which both of these sources of information were available it was possible to determine the amount of the difference between these two measures. In this investigation the differences also were studied as they were related to various farm characteristics or business factors.

Management research is often based on the actual experiences of farm operators. This was the situation in this study. The more than 300 farms for each year provided a basis for determining the existing situations on these farms. In general the farms were sorted according to selected characteristics or factors and then the differences were aggregated and averaged. The results are presented in tabular form. No statistical tests were performed on the data.

Prior to 1974 some studies were made by hand tabulating of DHI and FBR data on cards and then the cards were sorted, totaled and averages calculated. These earlier studies provide a basis for making comparisons and to show changes over time. The study made for 1963 was published* and some data cited in this report.

* A.E. Res. 161.

Records for the years 1977 and 1978 have been studied in detail. Indications are that the records for the other years would be similar.

Why the Difference

The DHI record system is designed to determine the total pounds of milk produced by each cow and in turn the total for the herd. The pounds for the year are computed based on the twelve monthly samples. Years of research and experience have made it possible for the DHI system to develop methods for calculating the annual production based on the twelve individual samples. In general, the method gives a good measure of the pounds of milk produced per cow.

The FBR system uses the pounds of milk on which the milk company paid the dairyman and this is the amount delivered or sold. With present day bulk milk tanks this is based on a measuring device in the tank rather than actual weight on a scales. The accuracy of the calibration of the tank is a factor to be considered. The concerns of both the farmer and the milk company are involved since the weights are the basis for the milk payments so they are likely to be watched and done with a reasonable degree of accuracy.

Assuming the DHI produced and the FBR sold figures are accurate or reasonably so there will be a difference due to the points of time and the practices followed by the dairyman. There are three major practices that give rise to a difference between these two measures. Many farms use some milk for feeding calves. This will vary by calf feeding systems followed. A second use of milk is by the farm family and by the farm workers' families. Again this varies by the numbers of people consuming this milk and their milk consumption habits. Still another item is the wastage. This may be due to such things as colostrum milk, milk from mastitis infected quarters, and to that of spillage. With modern milking systems there is likely to be less wastage due to spilling and the sticking to the sides of cans than was typical in the days of handling milk in cans.

Family use of milk, the feeding of milk to calves, and wastage gives rise to a logical difference between the pounds produced and the pounds sold. This is what might be called the reason why a difference exists. The amounts of this difference will vary according to the different situations found on farms. These specific differences in situations on farms were not available for each farm in the data used in this research so were not studied here.

Other things may also cause differences between the amount produced and the amount sold. The management practices followed would be one possibility. With good management wastages due either to spillages or to loss for health reasons would be minimized while poor management would cause the wastage to increase. Biases in collecting and handling samples for the DHI records could also be a factor in explaining variation in the differences. Efforts are made to have the system as accurate as possible but wherever the human element enters in there is potential for biases to become a factor. Persons aiming for high production records naturally would tend to have a bias toward their total amounts of milk produced.

These are all elements in answering the question of why the difference. In this study these elements are recognized as existing but the extent to which they affected the difference has not been determined. The procedure followed has been that of determining the amounts and nature of the differences and to see if the differences tend to be related to particular characteristics or business factors.

Characteristics of Farms Studied

Since 1974 information from the Dairy Herd Improvement (DHI) records and the Farm Business Management (FBR) records have been merged for study purposes. The major purpose was to observe the effects of selected dairy herd management practices on farm incomes. These results have been published for each year*.

This study is designed to focus on the specific topic of the differences in the amount of milk produced as reported by DHI and the amount of milk sold as reported by FBR. A few selected characteristics of the farms having both the DHI and FBR information are reported and discussed in this section.

Table 1. Number of Farms in Study and Number of Cows
 New York Dairy Farms, 1974-1979

| Year | Farms in Study | Average Number Cows |
|------|----------------|---------------------|
| 1974 | 413 | 74 |
| 1975 | 380 | 74 |
| 1976 | 337 | 70 |
| 1977 | 363 | 69 |
| 1978 | 370 | 68 |
| 1979 | 337 | 70 |

The numbers of farms included in the studies for 1974 through 1979 have ranged from 337 to 413. The average number of cows have ranged from 68 to 74. The average number of cows in this group is lower than the Farm Business summaries. The larger farm businesses often have two DHI herds and it is not possible to use them in these studies.

* 1974 in A.E. Staff Paper 75-27; 1975 in A.E. Res. 77-20; 1976 in A.E. Res. 77-20, 1977 in A.E. Res. 79-5; 1978 in A.E. Res. 80-1; 1979 in A.E. Res. 81-2.

Table 2. Man Equivalent and Milk per Man by Years
New York Dairy Farms, 1974-1978

| Year | Man Equivalent | | | Milk per Man | | |
|------|----------------|-----|------------|--------------|---------|------------|
| | DHI | FBR | Difference | DHI | FBR | Difference |
| 1974 | NA | 2.5 | --- | NA | 387,000 | --- |
| 1975 | 2.1 | 2.5 | 0.4 | 501,227 | 398,320 | 102,907 |
| 1976 | 2.0 | 2.5 | 0.5 | 508,025 | 383,440 | 124,585 |
| 1977 | 2.0 | 2.4 | 0.4 | 510,842 | 401,529 | 109,313 |
| 1978 | 2.0 | 2.4 | 0.4 | 517,718 | 404,669 | 113,049 |

Both the DHI and the FBR report man equivalent. There was a difference of 0.4 to 0.5 for the years 1975-1978. This difference focuses on the DHI including the man equivalent for the dairy herd only while the FBR includes all workers on the farm. This is a significant difference and should be kept in mind when using the man equivalent figures for the two groups.

Milk per man is also reported for both groups and again there is a wide difference. This difference is due to the milk produced vs milk sold and the difference in man equivalent. The DHI figures on milk per man were 26 to 32 percent greater than the pounds per man reported by FBR. The actual pounds per man difference ranged from 103,000 to 125,000.

Table 3. Milk per Cow and the Differences by Years
New York Dairy Farms, 1974-1979

| Year | Pounds Milk per Cow | | | Difference as % |
|------|---------------------|--------|------------|--------------------|
| | DHI | FBR | Difference | |
| 1974 | 14,197 | 13,438 | 759 | 5.3% |
| 1975 | 14,224 | 13,457 | 767 | 5.4 |
| 1976 | 14,515 | 13,694 | 821 | 5.7 |
| 1977 | 14,807 | 14,083 | 724 | 4.9 |
| 1978 | 15,227 | 14,401 | 826 | 5.4 |
| 1979 | 15,602 | 14,743 | 859 | 5.5 |

Pounds of milk per cow for both the DHI and the FBR increased each year from 1974 through 1979. The rate of increase was about the same. The difference between the pounds produced per cow and the pounds sold per cow ranged from 724 in 1977 to 859 in 1979. This is a variation of 135 pounds for the six years observed. There seemed to be a bimodal upward trend in the differences.

The average annual difference for all farms in the study as a percent of the DHI pounds of milk produced varied from 4.9% in 1977 to 5.7% in 1976. In general, it might be said that the DHI milk produced per cow figures are about 5 percent more than the amount of milk sold.

In a study made for the year 1963 and based on 173 farms the average difference was 710 pounds of milk per cow. This was on a DHI average of 12,750 pounds per cow or the difference was 5.6%.

Table 4. Distribution of Differences in Pounds of Milk Produced and Sold per Cow New York Dairy Farms, 1977 and 1978

| Pounds Difference Produced and Sold Per Cow | 1977 | | 1978 | |
|---|--------------|------------------|--------------|------------------|
| | Number Farms | Percent of Farms | Number Farms | Percent of Farms |
| Minus (Sold > Produced) | 27 | 8 | 21 | 6 |
| 0 to 499 | 63 | 17 | 53 | 14 |
| 500 to 999 | 109 | 30 | 110 | 30 |
| 1,000 to 1,499 | 73 | 20 | 104 | 28 |
| 1,500 to 1,999 | 59 | 16 | 50 | 13 |
| 2,000 or more | 32 | 9 | 32 | 9 |
| Total | 363 | 100 | 370 | 100 |

There was considerable range in the distribution of differences by individual farms. In 1978 there were 6 percent of the farms that reported more pounds of milk sold than produced. At the other extreme there were 9 percent of the farms that reported 2000 pounds or more milk produced than sold. The distribution in 1977 was similar to 1978.

With an average difference for 1978 of 826 pounds it appears that one out of eleven (9%) of the farms had differences of more than two and one-half times the average amount. The reasons for these large differences may be any of the several discussed in the section on "why the difference".

Table 5. Distribution of Differences in Pounds of Milk Produced and Sold per Cow 173 New York Dairy Farms, 1963

| Pounds Difference Produced and Sold Per Cow | 1963 | |
|---|--------------|------------------|
| | Number Farms | Percent of Farms |
| Minus (Sold > Produced) | 8 | 4 |
| 0 to 499 | 46 | 27 |
| 500 to 999 | 63 | 36 |
| 1,000 to 1,499 | 34 | 20 |
| 1,500 to 1,999 | 12 | 7 |
| 2,000 or more | 10 | 6 |
| Total | 173 | 100 |

The scatter in differences appears to have been slightly less in 1963 than in 1978. In 1963 only 6 percent of the farms had a difference of 2000 or more where as in 1977 and 1978 this was 9 percent. At the other end of the scale in 1963 only 4 percent reported selling more than was produced compared with 6 percent in 1978 and 8 percent in 1977.

The distribution for 1977 and 1978 was further examined by three herd size groups. These are reported in Table 6. There was no readily apparent difference in the distribution by herd sizes.

Table 6. Distribution of Differences in Pounds of Milk Produced and Sold per Cow by Herd Size New York Dairy Farms, 1977 and 1978

| Pounds Difference Produced and Sold Per Cow | 1977 | | | 1978 | | |
|---|----------------------|-------|---------------|------------------|-------|---------------|
| | Herd Size (cows) | | | Herd Size (cows) | | |
| | Under 55 | 55-99 | 100 & over | Under 55 | 55-99 | 100 & over |
| | - Percent of Farms - | | | | | |
| Minus (Sold > Produced) | 9 | 5 | 9 | 6 | 6 | 6 |
| 0 to 499 | 18 | 19 | 11 | 15 | 13 | 16 |
| 500 to 999 | 29 | 32 | 26 | 28 | 34 | 26 |
| 1,000 to 1,499 | 21 | 18 | 24 | 32 | 19 | 38 |
| 1,500 to 1,999 | 15 | 15 | 24 | 12 | 14 | 14 |
| 2,000 or more | 8 | 11 | 6 | 7 | 14 | 0 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 |
| Number Farms | 151 | 158 | 54 | 162 | 145 | 63 |

Differences by Farm Characteristics and Business Factors

The question is sometimes raised as to whether the differences between pounds of milk produced per cow and pounds of milk sold per cow are affected by or related to certain characteristics of the farm or the nature of the business. Consequently the data for the years 1977 and 1978 were examined with these things in mind. In this section the 1978 data are reported in tabular form and the findings are discussed. The data for 1977 was similar in most respects. The Tables for 1977 are included in the appendix if one wishes to make further comparisons.

Herd Size

The average number of cows in the herd for the year was used as the measure of herd size. Herd size is a business factor which affects many phases of the operation. Consequently size was the first factor examined to determine whether the differences in pounds of milk produced and sold per cow appeared to be affected by the size of the herd. The relationship for 1978 is reported in Table 7 below and similar information for 1977 is in Table 7A in the appendix.

Table 7. Differences in Milk Produced and Sold per Cow by Herd Size
370 New York Dairy Farms, 1978

| Herd Size (No. Cows) | Number of Farms | Average Pounds Milk | | | Differences as % Produced |
|-------------------------|--------------------|---------------------|--------|------------|------------------------------|
| | | Produced | Sold | Difference | |
| Under 40 | 53 | 14,875 | 13,853 | 1,022 | 6.9 |
| 40 - 54 | 109 | 14,969 | 14,015 | 954 | 6.4 |
| 55 - 69 | 76 | 15,256 | 14,354 | 902 | 5.9 |
| 70 - 84 | 48 | 15,991 | 14,637 | 1,354 | 8.5 |
| 85 - 99 | 21 | 15,551 | 14,597 | 958 | 6.2 |
| 100 - 149 | 50 | 15,162 | 14,337 | 825 | 5.4 |
| 150 & over | 13 | 15,573 | 14,702 | 871 | 5.6 |

In general, both pounds of milk produced and pounds of milk sold per cow were higher for the larger herds. However, there was no clearly apparent and consistent relationship between size of herd and the pounds of difference in milk produced and sold. Herds with over 100 cows did have the smallest difference in 1978 but this was not the situation for 1977.

The conclusion drawn from these data would be that the size of herd did not seem to be a major factor affecting the difference between milk produced and milk sold per cow.

Rate of Production

On a dairy farm the production per cow is an important business factor. For the analysis here the pounds of milk sold per cow was the measure used. The 1978 data are reported in Table 8 and the 1977 data are in Table 8A in the appendix.

Table 8. Differences in Milk Produced and Sold per Cow by Rate of Production
370 New York Dairy Farms, 1978

| Pounds Milk Sold per Cow | Number of Farms | Average Pounds Milk | | | Differences as % Produced |
|-----------------------------|--------------------|---------------------|--------|------------|------------------------------|
| | | Produced | Sold | Difference | |
| Under 10,000 | 9 | 10,113 | 8,657 | 1,456 | 14.4 |
| 10,000 - 10,999 | 13 | 12,458 | 10,823 | 1,635 | 13.1 |
| 11,000 - 11,999 | 24 | 12,903 | 11,839 | 1,064 | 8.2 |
| 12,000 - 12,999 | 50 | 13,859 | 12,744 | 1,115 | 8.1 |
| 13,000 - 13,999 | 69 | 14,525 | 13,672 | 853 | 5.9 |
| 14,000 - 14,999 | 72 | 15,578 | 14,659 | 919 | 5.9 |
| 15,000 - 15,999 | 75 | 16,475 | 15,442 | 1,033 | 6.3 |
| 16,000 & over | 58 | 17,571 | 16,815 | 756 | 4.3 |

The largest difference was for the lower producing herds. This may be due in part to some of the lower producing herds being high butterfat producers which have had the pounds produced adjusted because of butterfat while the pounds sold has not been adjusted. The percentage that the difference is of produced is also larger for the lower rates of production herds. The family use, wastage, and calf feeding amounts logically might constitute a larger part of a low producing cows production than would that of a high producing animal.

Table 9. Distribution of Differences in Milk Produced and Sold per Cow by Rates of Production
370 New York Dairy Farms, 1978

| Pounds Difference Produced and Sold per Cow | Pounds Milk Sold per Cow | | |
|---|--------------------------|---------------------|--------------------|
| | Under 12,000 | 12,000 to 13,999 | 14,000 and Over |
| | - Percent of Farms - | | |
| Minus (Sold > Produced) | 0 | 5 | 7 |
| 0 - 499 | 11 | 14 | 16 |
| 500 - 999 | 26 | 28 | 32 |
| 1,000 - 1,499 | 33 | 25 | 29 |
| 1,500 - 1,999 | 15 | 20 | 9 |
| 2,000 & over | 15 | 8 | 7 |
| Number of Farms | 46 | 119 | 205 |

Farms with the lower rates of production had a higher percentage of the total with 2,000 or over differences. On the other hand, the higher rates of production herds had the smallest percentage with differences of 2,000 or more (Table 9).

The distribution of differences suggests that the lower producing herds tend to have both larger amounts and a higher proportion of large differences than do the higher producing herds. The cause of this situation might warrant further study.

Registered Herds vs Grade

Table 10. Differences in Milk Produced and Sold per Cow by Registered vs Grade Herds
370 New York Dairy Farms, 1978

| Kind of Herd | Number of Farms | Average Pounds Milk | | | Differences as % Produced |
|-----------------|--------------------|---------------------|--------|------------|------------------------------|
| | | Produced | Sold | Difference | |
| Registered | 122 | 15,371 | 14,471 | 900 | 5.9 |
| Grade | 248 | 15,157 | 14,261 | 896 | 5.9 |

The registered herds averaged about 200 pounds more milk per cow than the grade herds but the difference between milk produced and sold per cow was the same (Table 10).

When examined on the basis of distribution of differences for 1978 there was a higher proportion of the registered herds with a difference of 2,000 pounds or more than for the grade herds. The same situation existed for 1977.

Table 11. Distribution of Differences in Pounds of Milk Produced and Sold per Cow by Registered and Grade Herds New York, 1977 and 1978

| Pounds Difference Produced and Sold per Cow | 1977 | | 1978 | |
|---|----------------------|-------------|------------------|-------------|
| | Registered Herds | Grade Herds | Registered Herds | Grade Herds |
| | - Percent of Farms - | | | |
| Minus (Sold > Produced) | 8 | 7 | 4 | 7 |
| 0 - 499 | 16 | 18 | 16 | 13 |
| 500 - 999 | 29 | 31 | 33 | 28 |
| 1,000 - 1,499 | 21 | 20 | 24 | 30 |
| 1,500 - 1,999 | 15 | 17 | 11 | 15 |
| 2,000 & over | 11 | 7 | 12 | 7 |
| Total | 100 | 100 | 100 | 100 |
| Number of Farms | 123 | 240 | 122 | 248 |

The distribution was examined for the years 1977 and 1978 by registered and grade herds. The registered herds had a somewhat larger percentage of farms with a difference of 2,000 or more pounds per cow than the grades. In 1977 the registered herds had 11% vs 7% for the grades and in 1978 the numbers were 12% vs 7%. This might follow as a result of the desire of farms with registered herds to sell animals for production purposes and thereby striving for high DHI production figures.

Age and Education of Operator

Age and education of the operator was used as a factor that might be related to the differences in pounds of milk produced and sold per cow. The information was examined for the 1978 business year.

Table 12. Differences in Milk Produced and Sold per Cow by Age of Operator, 370 New York Farms, 1978

| Age of Operator | Number Farms | Average Pounds of Milk | | | Difference as % Produced |
|-----------------|--------------|------------------------|--------|------------|--------------------------|
| | | Produced | Sold | Difference | |
| Under 30 | 48 | 14,422 | 13,943 | 479 | 3.3 |
| 30 - 34 | 60 | 15,170 | 13,905 | 1,265 | 8.3 |
| 35 - 39 | 70 | 15,537 | 14,567 | 810 | 5.3 |
| 40 - 44 | 57 | 15,450 | 14,600 | 850 | 5.5 |
| 45 - 49 | 44 | 15,327 | 14,247 | 1,080 | 7.0 |
| 50 & Over | 91 | 15,388 | 14,460 | 928 | 6.0 |

Pounds of milk produced and sold per cow tended to increase with age of operator up to 40-44 years of age and then leveled off. However, there seemed to be no relationship between the age of the operator and the difference between the amount produced and sold per cow.

Table 13. Differences in Milk Produced and Sold per Cow by Education of Operator, 370 New York Farms, 1978

| Years of School | Number Farms | Average Pounds of Milk | | | Difference as % Produced |
|-----------------|--------------|------------------------|--------|------------|--------------------------|
| | | Produced | Sold | Difference | |
| Under 12 | 20 | 15,533 | 14,563 | 970 | 6.2 |
| 12 | 153 | 15,085 | 14,154 | 931 | 6.2 |
| 13-14 | 68 | 14,902 | 14,146 | 756 | 5.1 |
| 15 or more | 78 | 15,354 | 14,416 | 938 | 6.1 |

The 20 farms with operators who had not completed high school (12 years of school) had the highest pounds of milk produced and sold per cow. The 78 farm operators with 15 or more years of school which indicates more than two years of college had the second highest rates of production. The differences between pounds of milk produced and sold per cow did not seem to be related to the education of the operator.

Managerial Ability of Operator

The capabilities or managerial ability of the operator is important but it is difficult to measure. In some studies the level of the labor and management income per operator has been used as an indicator of managerial ability. In this study the farms were divided into quintiles on the basis of the labor and management incomes per operator. The results for 1978 are reported in Table 14.

Table.14 Differences in Milk Produced and Sold Per Cow by Labor and Management Income Quintiles, 370 New York Farms, 1978

| Managerial Ability (Income Quintile) | Number Cows | Average Pounds Milk | | | Difference as % Produced |
|---|----------------|---------------------|--------|------------|-----------------------------|
| | | Produced | Sold | Difference | |
| 1 (Low) | 56 | 14,773 | 13,686 | 1,087 | 7.4 |
| 2 | 57 | 15,077 | 14,093 | 984 | 6.5 |
| 3 (Medium) | 64 | 15,137 | 14,219 | 918 | 6.1 |
| 4 | 72 | 15,447 | 14,439 | 1,008 | 6.5 |
| 5 (High) | 93 | 15,702 | 14,806 | 896 | 5.7 |

The operators with the most managerial ability (high quintile) produced and sold the most milk per cow and had the largest herds. With the exception of the fourth quintile group there was some indication that the difference between the pounds produced and sold per cow decreased slightly as the managerial capacity increased. This would be consistent with expectations i.e., better managers would keep the wastage etc. to a minimal level.

Heifers as Percent of Cows

It was assumed that possibly farms that raised a large number of heifers might use more milk for calf feeding and in turn the difference between the amount produced and sold might be greater. To study this the farms were sorted on the basis of the measure "heifers as percent of cows". The results for 1978 are reported in Table 15.

Table 15. Differences in Milk Produced and Sold Per Cow by Relation of Heifers to Cows, 370 New York Farms, 1978

| Percent Heifers are of Cows | Number Farms | Average Pounds Milk | | | Difference as % Produced |
|--------------------------------|-----------------|---------------------|--------|------------|-----------------------------|
| | | Produced | Sold | Difference | |
| 30 or less | 20 | 14,573 | 13,445 | 1,128 | 7.7 |
| 31 - 40 | 11 | 14,246 | 13,107 | 1,139 | 8.0 |
| 41 - 50 | 23 | 15,149 | 14,033 | 1,116 | 7.4 |
| 51 - 60 | 51 | 14,967 | 13,996 | 971 | 6.5 |
| 61 - 70 | 77 | 14,929 | 14,119 | 810 | 5.4 |
| 71 - 80 | 46 | 15,085 | 14,127 | 958 | 6.4 |
| over 80 | 142 | 15,710 | 14,917 | 793 | 5.0 |

The farms with 80 percent or more as many heifers as cows had the highest pounds of milk produced and sold per cow and the smallest difference between pounds of milk produced and sold per cow. This suggests that raising a relatively large number of heifers is a desirable practice for getting higher rates of production and it does not affect the difference between the amount of milk produced and sold per cow.

Kind of Barn and Milking System

The kind of barn and milking system seemed like possible situations that might affect the differences in the amounts of milk produced and sold. The farms were sorted on these two factors and the results observed are reported in Tables 16 and 17.

Table 16. Differences in Milk Produced and Sold
Per Cow by Type of Barn, 370 New York Farms, 1978

| Type of Barn | Number Farms | Average Pounds Milk | | | Difference as % Produced |
|--------------|--------------|---------------------|--------|------------|--------------------------|
| | | Produced | Sold | Difference | |
| Freestall | 119 | 15,355 | 14,418 | 937 | 6.1 |
| Stanchion | 243 | 15,165 | 14,189 | 976 | 6.4 |
| Other | 8 | 15,223 | 14,018 | 1,205 | 7.9 |

Both pounds of milk produced and sold per cow in the freestall barns was about 200 pounds larger than for the stanchion barns. The difference between the pounds produced and sold per cow was about 40 pounds less for the freestall barns. The percent that the difference was of the pounds produced was 6.1% for the freestall barns and 6.4% for the stanchion barns. This suggests that the freestall barns might be a factor affecting the amounts produced and the wastage encountered.

Table 17. Differences in Milk Produced and Sold
Per Cow by Milking System, 370 New York Farms, 1978

| Type of Milking System | Number Farms | Average Pounds Milk | | | Difference as % Produced |
|------------------------|--------------|---------------------|--------|------------|--------------------------|
| | | Produced | Sold | Difference | |
| Bucket & Carry | 7 | 14,045 | 13,706 | 339 | 2.4 |
| Dumping Station | 96 | 14,201 | 13,270 | 931 | 6.6 |
| Pipeline | 161 | 15,727 | 14,780 | 947 | 6.0 |
| Herringbone | 82 | 15,298 | 14,499 | 799 | 5.2 |
| Other Parlors | 24 | 16,092 | 14,995 | 1,097 | 6.8 |

Pipelines around the barn and the dumping station types of milking systems were the most common in the stanchion barns while the herringbone parlor system predominated in the freestall barns. The pipeline systems had slightly higher production per cow and amount sold per cow than the herringbone parlor systems. On the other hand, the difference between the amounts produced and sold per cow were about 150 less for the herringbone system than for the pipeline systems. The respective percentages that the differences were of the amount produced were 6.6% for the dumping stations, 6.0% for the pipelines, and 5.2% for the herringbone systems.

These data suggest that the type of milking system may have some effects on the differences between the amounts of milk produced and sold per cow.

Pounds Concentrates Fed

Levels of grain feeding is an important herd management practice. The DHI records do report the average pounds of concentrates fed per cow. These are based on the monthly data gathered and are the estimates of the dairyman and the DHI supervisors. Since this is such a key factor it was used as a point for analysis in this study.

Table 18. Differences in Milk Produced and Sold Per Cow
by Pounds of Concentrates Fed
370 New York Farms, 1978

| Pounds Concentrates Fed Per Cow | Number Farms | Average Pounds Milk | | | Difference as % Produced |
|---------------------------------|--------------|---------------------|--------|------------|--------------------------|
| | | Produced | Sold | Difference | |
| Under 4,000 | 14 | 13,432 | 12,497 | 935 | 7.0 |
| 4,000 - 4,999 | 81 | 13,696 | 12,812 | 884 | 6.4 |
| 5,000 - 5,999 | 107 | 15,081 | 14,266 | 815 | 5.4 |
| 6,000 - 6,999 | 94 | 15,965 | 14,977 | 988 | 6.2 |
| 7,000 - 7,999 | 50 | 16,327 | 15,125 | 1,202 | 7.4 |
| 8,000 & over | 26 | 16,863 | 15,651 | 1,212 | 7.2 |

The more concentrates fed per cow the more milk produced and sold as would be expected. The difference between produced and sold tended to increase as the concentrates fed increased about 5,000 pounds per cow. The respective percentages that the difference was of the amount produced were 5.4%, 6.2%, 7.4% and 7.2%. This suggests a possible relationship between levels of concentrate feeding and the differences between produced and sold per cow.

Summary and Conclusions

Rate of production is an important management factor on a dairy farm. Two measures have been developed and are commonly used by dairy farmers and those working with them. The two measures are "pounds of milk produced per cow" as used in Dairy Herd Improvement records and "pounds of milk sold per cow" as used in the Farm Business Management summaries. The two measures are different but are often used interchangeably.

The purpose of this study was to observe the amounts of difference in these two measures and to identify business characteristics or factors that might affect or be related to these differences. Two other factors, man equivalent and pounds of milk per man were observed and quantified. Farms with both Farm Business Management summary records and Dairy Herd Improvement records were studied and compared.

For the years 1974 to 1978 the difference in the man equivalent reported by DHI and the FBR was 0.4 and 0.5. This was with an average man equivalent of 2.0 to 2.5. The milk per man difference ranged from 103,000 to 125,000 pounds on figures of 400,000 to 520,000 or 26 to 32 percent.

The average pounds difference for the years 1974-1979 between milk produced and milk sold per cow ranged from 724 to 859 pounds and 4.9 to 5.5 percent of the pounds produced. This compares with an average of 710 pounds and 5.6 percent for a similar study made for 1963.

Differences between milk produced and milk sold per farm for 1978 varied from 6 percent who "sold" more than "produced" to 9 percent who produced 2,000 or more pounds than was sold. For 1963 the respective percentages were 4% and 6% or a somewhat smaller spread. There was no apparent relationship between these spreads and the size of herds for 1977 and 1978.

The farms were studied by different characteristics and business factors. The factors that showed some relationship to the differences in pounds of milk produced and sold per cow included milk per cow, type of barn, type of milking system, rate of concentrate feeding, ratio of heifers to cows, and managerial ability as measured by labor and management income per operator. The factors showing no clear relationships were size of herd, registered or grade herds, age of operator and education of the operator.

Data for 1977 were also studied in detail. The results were similar to those for 1978. Tables showing the 1977 data are in the appendix.

APPENDIX

Table 7A Differences in Milk Produced and Sold
Per Cow by Herd Size
363 New York Dairy Farms, 1977

| Herd Size (No. Cows) | Number Farms | Average Pounds Milk | | | Difference as % Produced |
|-------------------------|-----------------|---------------------|--------|------------|-----------------------------|
| | | Produced | Sold | Difference | |
| Under 40 | 49 | 13,918 | 13,572 | 346 | 2.5 |
| 40 - 54 | 102 | 14,571 | 13,776 | 795 | 5.5 |
| 55 - 69 | 83 | 14,832 | 13,857 | 975 | 6.6 |
| 70 - 84 | 53 | 15,427 | 14,589 | 838 | 5.4 |
| 85 - 99 | 22 | 14,920 | 14,174 | 746 | 5.0 |
| 100 - 149 | 35 | 15,218 | 14,323 | 895 | 5.9 |
| 150 & over | 19 | 15,636 | 14,577 | 1,059 | 6.8 |

Table 8A Differences in Milk Produced and Sold
Per Cow by Rate of Production
363 New York Dairy Farms, 1977

| Pounds Milk Sold Per Cow | Number Farms | Average Pounds Milk | | | Difference as % Produced |
|-----------------------------|-----------------|---------------------|--------|------------|-----------------------------|
| | | Produced | Sold | Difference | |
| Under 10,000 | 16 | 10,224 | 9,155 | 1,069 | 10.5 |
| 10,000 - 10,999 | 16 | 11,988 | 10,864 | 1,124 | 9.4 |
| 11,000 - 11,999 | 27 | 12,839 | 11,611 | 1,228 | 9.6 |
| 12,000 - 12,999 | 56 | 13,533 | 12,769 | 764 | 5.6 |
| 13,000 - 13,999 | 79 | 14,444 | 13,604 | 840 | 5.8 |
| 14,000 - 14,999 | 62 | 15,303 | 14,471 | 832 | 5.4 |
| 15,000 - 15,999 | 65 | 16,501 | 15,513 | 988 | 6.0 |
| 16,000 & over | 42 | 17,921 | 17,126 | 795 | 4.4 |

Table 9A Distribution of Differences in Milk Produced and Sold
Per Cow by Rate of Production
363 New York Dairy Farms, 1977

| Pounds Difference Produced and Sold Per Cow | Pounds Milk Sold Per Cow | | |
|---|------------------------------|---------------------|--------------------|
| | Under 12,000 | 12,000 to 13,999 | 14,000 and over |
| | - - - Percent of Farms - - - | | |
| Minus (Sold > Produced) | 7 | 7 | 8 |
| 0 - 499 | 12 | 18 | 19 |
| 500 - 999 | 27 | 30 | 31 |
| 1,000 - 1,499 | 19 | 22 | 19 |
| 1,500 - 1,999 | 15 | 18 | 15 |
| 2,000 & over | 20 | 5 | 8 |
| Number of farms | 59 | 135 | 169 |

Table 10A. Differences in Milk Produced and Sold
Per Cow by Registered vs Grade Herds
363 New York Dairy Farms, 1977

| Kind of Herd | Number Farms | Average Pounds Milk | | | Difference as % Produced |
|--------------|--------------|---------------------|--------|------------|--------------------------|
| | | Produced | Sold | Difference | |
| Registered | 123 | 14,895 | 13,866 | 1,029 | 6.9 |
| Grade | 240 | 14,762 | 13,795 | 967 | 6.6 |

Table 14A. Differences in Milk Produced and Sold
Per Cow by Labor and Management Income Quintiles
363 New York Dairy Farms, 1977

| Managerial Ability (Income Quintile) | Number Cows | Average Pounds Milk | | | Difference as % Produced |
|--------------------------------------|-------------|---------------------|--------|------------|--------------------------|
| | | Produced | Sold | Difference | |
| 1 (Low) | 72 | 14,560 | 13,910 | 650 | 4.5 |
| 2 | 61 | 14,100 | 13,400 | 700 | 5.0 |
| 3 (Medium) | 65 | 14,922 | 14,423 | 499 | 3.3 |
| 4 | 63 | 14,834 | 13,797 | 1,037 | 7.0 |
| 5 (High) | 84 | 15,630 | 14,704 | 926 | 5.9 |