

Record Keeping for Improved Herd Management

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Record Keeping

Maintaining a dairy farm requires commitment, hard work and timely execution of interrelated tasks. Feeding, milking, animal care, heat detection, breeding, growing and harvesting forages, disease detection and treatment, maintaining machinery and equipment are examples of dairy farm tasks. Each task is associated with a labor force. Organizing and guiding the labor force is also part of dairy producers' activities. With the high demands of time and continuous decision making, record keeping is a vital part of a successful dairy farm. For example, milk production is directly or indirectly affected by all activities on a dairy farm (Figure 1). Balancing between these activities is important for maintaining optimum milk production. Maintaining animal production records, financial records and inventories can augment management plans and improve decision-making to keep balance between these activities.



Figure 1: Relationship between milk production and farm factors

Successful dairy operations incorporate three management principles (Fuhrmann, 2006):

1. Organizing work for efficiency and productivity
2. Training and motivating workers
3. Monitoring the results of work and workers

Records provide easy access to current and historic farm data to aid in organization, training and monitoring management change impacts. Computerized records also provide reports, graphs and generated lists for quick reference, such as expected cows in heat, dry off dates and calving dates.

Milk yield, reproduction, variable feed costs and health status are some of the key performance indicators (**KPI**) in dairy farms (Hansen et al., 2005). Records could be integrated to interpret the key performance indicators in a dairy farm. For example, to increase breeding efficiency it is necessary to keep track of heat detection rate, date of service, services per conception, conception rate, days open, percent of herd pregnant, days in milk, abortion rate, etc. Feeding and health status are also related to breeding health. However, this is just one aspect of a dairy operation. Herd nutrition, genetics, environment and management also influence these KPIs. Without easily accessible and useful records, farmers must rely on memory that can be unreliable and incomplete, which hinders time management.

Importance of Record Keeping

Records must meet certain standards.

1. Records should be simple, useful and must lead to an action
2. Records must be kept in a way that they can be converted easily into usable information
3. Duplication between records should be avoided to save time and effort

Farm records assist in management, financial and land-use decisions through:

1. Understanding how money is spent or earned
2. Finding ways of reducing expenses to increase income
3. Managing monthly cash flow
4. Making feed management decisions
5. Making herd expansion or reduction decisions
6. Making individual cow culling or replacement decisions
7. Efficient management of labor
8. Decision making regarding production, health, breeding and feeding
9. Identifying farm strengths and weaknesses and opportunities for improvement
10. Efficient management of available resources

Records to Keep

Farm records can be categorized into three basic types.

1. Production records: reflect production of both crops and livestock. Crop records can include variety, crop rotation, yields, fertilizer and pesticide application rates, and labor management. The data from these types of records should help understand the efficiency of crop production. Livestock records might include individual animal records, birth records, breeding, performance, feeding, mortality, illness and labor.
2. Resource inventories: track the net worth of a farm. Inventories of resources on a farm provide an idea of the items that can be liquidated quickly to generate cash when needed. Resource inventories might include the number of animals, acres of land available, buildings and structures, tractors, equipment and bushels of stored crops.
3. Financial records: track cash flow, cost of production, income and expenses and the relationship between owned assets and liabilities. A balance sheet, income statement or cash flow statement can be used for this purpose. Some producers also use a transaction journal or general ledger.

Record Keeping Systems

Record keeping can be done by various methods including handwritten, computerized or a combination of both. According to USDA (2014) data, more than 70 percent of small (30 to 99 cows) and medium (100 to 499 cows) farm operations use handwritten records. Most large operations (94 percent; 500 or more cows) use a computerized system of record keeping. The selection of the record keeping system depends on the producers' personal management style and the system's ease of use. The use of computerized record keeping systems has increased with the increase of herd size over the years. However, both systems have their benefits. Handwritten record keeping systems are easy to use and have a low initial investment cost. However, they are time consuming with more opportunities for mistakes and limited potential for analysis. Computerized record keeping systems have a higher initial investment cost and may require some training. However, they can be viewed from multiple locations, have less opportunity for mistakes and provide record analysis and data visualization. A combination of both hand-written records for initial information and use of computerized record keeping for long-term storage and analyses has the greatest potential for success.

Handwritten Record Keeping Systems

The majority of small to medium dairies uses handwritten records. Although 94 percent of large dairy operations use a computerized record keeping system, about 38 percent also use handwritten records (USDA, 2014). An example of a written record that can be combined with computerized records are individual daily fresh cow monitoring cards (Figure 2). This record provides an easy way to record body condition score, calving difficulty score, daily body temperature and any other observations that might suggest any deviations from normal. Maintaining these records during the fresh period allows producers to treat cows quickly. Veterinarians or extension agents can use these records to improve treatment or management recommendations.

Some producers also keep handwritten financial records in a journal format. Information like purchase dates, quantity, different sizes of the items purchased and quantity price are included in this type of record. The problem with this type of handwritten record is that it requires extensive study of records to find the direction or area of focus for the farm operation. To better analyze and visualize this information, computerized systems are ideal because of the amount of the information requiring processing.

Cow ID:						Lactation no.:							
Calving date:						Calving difficulty score:							
Calf ID:						BCS at calving:							
Date	Days in milk	Body condition score	Rectal temperature	Uterine discharge score	Manure score	Locomotion score	Retained placenta	Ketosis (Yes/No)	Milk fever (Yes/No)	Mastitis (Yes/No)	Treatment received	Results	Additional observations

Figure 2: Daily fresh cow monitoring card

Computerized Record Keeping Systems

Dairy herd management software (PCDART, DairyCOMP 305, DHI Plus, etc.) can be used to record and analyze data including breeding success, production, health, lactation curves and milk test results. Herd management software also interface with various testing services and precision technology tools. The Dairy Herd Improvement Association (DHIA) is a national association that helps dairy producers track and manage cattle records. In addition to records management, milk production and quality information can also be collected by a monthly visit from a technician. The DHIA also tracks genetic history of the herd, which can be used to predict yearly production of offspring from a particular cow or bull performance. Producers can also input and track calving and breeding information, pregnancy status, drying off time and vaccination schedules. User-defined reports can also be created based on a producer's needs. Daily autogenerated reports could include cows and heifers that are due to calve, breeding lists, health reports and vaccination needs. Reports can also track milk production, somatic cell count (SCC), reproduction and health.

Role of Records in Management

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Individual Animal Records

Any records need an animal identification number to refer the particular animal. Every animal must have an individual identification number that is not repeated during that animal's productive life. Tattoos, electronic identification (EID or RFID tags), ear tags and neck collars are common methods for animal identification. Check with your breed association ([Holstein](#), [Jersey](#), [Ayrshire](#), [Brown Swiss](#), [Guernsey](#), [Red and White](#) and [Milking Shorthorn](#)) to find breed specific guidelines or order electronic identification tags.

Individual animal records may include cow identification, breed, sire information, dam information, milk production records, breeding records, health records and calving records. The following sections will go more in depth into each type of record.

Milk Production Records

Milk production records are an integral part of a dairy record system. Production records are indicative of animal value and health. Based on production records, producers can make culling, feeding and breeding decisions to increase animal efficiency and reduce costs. Milk production may be available daily, monthly or per bulk tank pick up. Manual recording may be done using weigh jars (individual cow) or by looking at bulk tank volume (lactating herd). Technologies can be added to the milking system to automatically record production per cow, and occasionally components like fat and protein or health indicators like electroconductivity or SCC. Producers can also use bulk tank reports (hundredweight, protein, fat and SCC) to make and track herd level management changes.

Dairy producers enrolled in the DHIA program are provided a monthly report. This report provides individual animal milk production, fat and protein for the day of testing. Somatic cell count can also be run on these milk samples for a nominal fee to determine any cattle with subclinical mastitis.

Higher bulk tank somatic cell count (**BTSCC**) could indicate ongoing mastitis infections in the herd, poor hygiene, poor equipment maintenance or an overall management problem. Producers can use DHIA records to identify individual cows with an elevated SCC. Producers may use a California Mastitis Test (**CMT**) to quickly identify quarters with an elevated SCC. To identify which organism is causing an elevated SCC, producers should sample and culture individual quarter milk samples.

Producers not currently enrolled in the DHIA program can get information about enrollment and DHIA on the [DHIA website](#). Names and contact information for area DHIA laboratories are also provided.

Breeding Records

Assessment of a breeding program in a farm should be made based on some measurable breeding goals that the producers need to set (Eckelkamp et al., 2020). Producers may set a goal to achieve certain number of services per conception, pregnancy rate or calving interval. Maintaining up-to-date breeding records allow them to identify the area where more improvement is needed to achieve those goals. Breeding records may include calving

information, heat dates, service history, sire information, services per conception, days to first service, pregnancy status and results of veterinary inspection (open, pregnant, cystic, etc.). With these records, producers will be able to determine which cows to check for heats, number of services required per conception, identify repeat breeders, breeding dates, dry-off dates and expected calving dates.

Keeping records on breeding history enables producers to avoid inbreeding in their herd, which is responsible for reduced reproductive and productive performance (Adamec et al., 2006). If producers keep track of the bull they used for breeding a given cow, they can avoid breeding the offspring from that cow with the same bull, or his offspring, in the future. Breeding records can also be used for dairy herd genetic improvement. Culling poor performing cows (cows with higher calving interval, lower pregnancy rate or repeat breeding signs) and breeding the best cows with sexed semen high genetic merit sires enables producers to accelerate genetic improvement. Dam production and reproduction records can help determine heifer value and selection of the best replacement heifers. On the sire side, dairy producers could use sire summaries or look through sire catalogs to identify the best bull to breed their cows. Many semen companies also offer mating services to help meet farm goals. However, producers still need to keep records of the bulls that they used for their cows, along with the genetic makeup of the bull that was used for breeding.

Health Records

Health records enable producers to track diseases, treatments and vaccination history. Health records also can be used as an indicator of where to focus efforts and improve production status. Records from health examination enable producers to identify the signs of disease early. Early detection of disease symptoms allows them to make treatment decision early, stop disease progression and even reduce the disease incidence rate on the farm. For example, 30 to 50 percent of dairy cows are at risk of experiencing metabolic or infectious diseases during the transition period (three weeks before to three weeks after calving) (Leblanc, 2010). During this period, it is important to regularly check health status (temperature, ketone status, feed intake and uterine discharge) and record it. Recording calving difficulty score is crucial as cows with difficult calving often suffer from retained placenta or metritis later on (Han and Kim, 2005). Cows with high rectal temperature could be suffering from infectious diseases or heat stress. Low rectal temperature could be indicative of a metabolic disease like milk fever. Monitoring animals throughout lactation for mastitis, high SCC, lameness and body condition score can also help identify animals that are routinely sick, too thin or too fat that may be decreasing farm efficiency. Chronically ill animals should not be considered for rebreeding, and may be good candidates for early culling.

Calf Register

Calves are the future of any dairy business (Bach and Ahedo, 2008). Keeping calf records will allow producers to track back the dam/sire and predict the performance of replacement heifers or potential herd bulls to sell. A calf register generally includes calf ID, dam and sire information, birth date, sex, birth weight, type of service (AI or natural service) and polled or horned. Measuring and recording body weight of calves at predetermined times throughout growth can ensure that heifers are achieving expected body weight and height. Calves should reach breeding weight and height before being run with a bull or receiving their first AI service. Other important records to keep in the calf register could be the colostrum feeding history, vaccination record, deworming record and disease history. Keeping colostrum feeding record is important to ensure every calf received colostrum after birth. Colostrum feeding is essential to develop immunity and maintain healthy calves. Prevention, treatment and disease history may provide important data on specific disease prevalence, which could alter management or prevention strategies.

Resource Inventories

Producers use many resources (i.e. land, machinery, labor and breeding stock) on their farm operations. Resource records should include both the assets and liabilities of a farm. Farm assets are resources owned or controlled by the owner that can generate future cash flow. Farm assets could include acres of land and forest, buildings, livestock, chemicals, amount of feed stored and tractor and machineries. Farm liabilities are monies or resources owed to other parties, such as the bank or loan agency. Having resource inventories and knowing their value allows producers to calculate the net worth of their farms, which is important for applying for bank loans and monitoring farm efficiency.

Financial Records

Financial records provide data and information to obtain and manage credit, calculate income taxes, plan future improvements, understand cash flow, and understand sources of income and expenses for the farm. Expenditure and revenue records are required for cash analysis and making financial decisions. Financial records may include cost of production, price of milk per hundredweight, cost of equipment, etc. There are several tools for financial record analysis that are necessary for short- and long-term financial decisions. Balance sheets, income statements and monthly cash flow statements make it easier to know the net worth of the farm on a specific date. A balance sheet categorizes the assets available in the farm with their values and contains information regarding liabilities to provide the net worth of the farm for a particular period. An income statement summarizes the income and costs of a farm during a specific period to calculate the net farm income. Income statements can be used to calculate the per hundredweight milk production cost, cull cow income or rate of return on farm assets. In addition, these are necessary to identify changes or improvements that could benefit a farm operation. Figure 3 represents a balance sheet of a dairy farm, indicating current assets, liabilities and net worth of that dairy farm.

Current assets	Value (\$)	Current liabilities	Value (\$)
Stocks	10,000	Accounts payable	5,000
Accounts receivable	7,000	Bank loan	35,000
Bank account	15,000	Accrued interest	5,000
Cash and checking	25,000	Principle due within 12 months	50,000
Growing crops	20,000		
Other current assets	5,000		
Fixed assets			
Land	20,000		
Barn	25,000		
Farm machineries	14,000		
Shares	3,000		
Dairy cows	20,000		
Total	164,000		95,000
Net worth	69,000		

Figure 3: An example of a current balance sheet of a dairy farm

In this competitive market, quality and production efficiency should be maintained while keeping the cost of production low. In order to do that, producers can benchmark to the local and national market. Benchmarking is comparing production, costs and returns to market averages. It is used to monitor income, investment costs and operating costs. Producers may compare their overall farm profit, milk sales or labor cost with others and the industry. Rate of return in relation to the investment and operating costs indicates farm profitability.

Understanding and analyzing different financial records can be difficult. The University of Tennessee Extension MANAGE Program helps with farm business financial analyses. Area specialists provide individual farm financial planning and educational workshops. Detailed information about the program and the contact information of the farm management specialist in your area is available on the [program website](#).

For financial record keeping, producers may use any software program like Excel, [Quickbooks](#), [Quicken](#), [PCMars](#), [Farm Biz](#) or [Farmer Core](#).

Conclusions

1. Record keeping helps manage the balance of resources, production, reproduction and interrelated tasks on a dairy farm.
2. Farm records should be easy to keep and easily converted to meaningful information that leads to an action.
3. Farms records should include animal production, incomes and expenses, and available resources of a farm.
4. Both handwritten and computerized record keeping systems can be used effectively. Combination of these two systems is often helpful.
5. Several online resources are available for keeping production and financial records.
6. Analysis and converting records to meaningful actions might sometimes be difficult. Reach out to your [county Extension agent](#), [area MANAGE specialist](#) or [UT Dairy Specialist](#) for help with keeping and interpreting records.

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