A FORM TO DEVELOP GOALS
FOR DAIRY PRODUCTION MEDICINE PROGRAMS

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INTRODUCTION

A production medicine program is a continual search to identify the current limitations of herd production and health and to develop solutions to those problems. For the programs to remain viable, the veterinarian must remain focused upon emerging problems and the dairy manager must remain committed to solving those problems. However, maintaining a focus on emerging problems and a commitment to their solution can be an elusive undertaking.

A production medicine program may begin on a dairy with the identification of nutrition management as the primary production limiting problem. The problems are defined and a program is designed to solve them. A year later, the nutrition issues may be resolved and opportunities might well be found in improvements of other aspects of herd management. Yet the nutrition program may have developed its own routine of production monitoring, feedstuff analysis, and ration formulation. Dairymen and veterinarians, like all people, tend to be creatures of habit. The once dynamic process of problem identification and solution has become static. There is no search for the next opportunity. In fact, the program is no longer a production medicine program, but has regressed back to a traditional nutrition program.

Monitoring performance of a herd also has its pitfalls. Monitoring herd performance allows veterinarians and herd managers to identify emerging problems early and to measure progress toward goals. Many veterinarians set up a program to monitor herd performance, but fail to clearly establish the goals that are expected for the herd. Monitoring is a pointless exercise if the client is not committed to recognizing and solving problems

This paper describes a form that can be used to identify dairy herd problems and establish production goals with the dairy manager. Completion of the form can increase client commitment to problem solving and monitoring of herd performance.

THE GOAL FORM

In the summer of 1988, I developed a form to help identify production opportunities and set goals. It was designed to:

1. Be *completed in a discussion with a client*
2. Utilize the *clients records and their estimates of costs* wherever possible
3. Provide a *limited economic assessment* of different production problems
4. Provide a format to *mutually agree on production goals* for the herd
5. Set the stage to *develop a plan* to accomplish these goals

The form has been redesigned or updated many times since the first version in order more clearly define opportunities and remain current with industry data. The form is divided into sections on replacements and culling, udder health, genetics, reproduction, and nutrition. These sections are followed by a sheet to summarize areas for attention, list the goals, and describe a working plan.

The form requires the several pieces of information: the number of heifers on the farm that have not calved, the girth and height of recently calved heifers, current milk plant pricing policy, and the DHI herd summary sheet. In addition, records or estimates of heifer deaths, clinical mastitis case rates, and a variety of prices will be needed. It is useful to have a calculator. Personal experience indicates that it takes approximately 2 hours to complete the form and the resulting discussions.

<u>Replacement Heifers</u>

The replacement section includes a summary of heifer mortality rate, age at first calving, and size. The mortality rate, and age at which they begin milk production are related primarily to efficiency, whereas size at calving directly relates to production.

1. Heifer mortality rate

Heifer mortality rates are determined from records or estimated from memory. Dividing the deaths into stillborn, pre-weaning, and after weaning categories is useful diagnostically. Reports from the National Dairy Heifer Evaluation Project suggest that the average stillborn rate is 1.5% and the pre-weaning mortality rate in the Midwest is about 7% (NAHMS, 1994). Our opinion regarding average mortality rates after weaning is 4%. Goal rates have been set arbitrarily based upon these figures.

The price assigned to lost heifers will vary with the farm and the average age at the time of death and could range from about $150 to a newborn heifer and $1,200 to a pregnant, springing heifer.

2. Calving age of replacements

The form next requests average age at first calving. This index is found on most DHI summary sheets. The dairyman is asked to put a price per day to maintain two-year old heifers. If the dairyman is reluctant to estimate a cost, asking what he would charge to board his neighbors pregnant heifers will usually generate a prompt estimate. This is a gross opportunity estimate. No effort is made to estimate the alternative costs of growing the heifers at greater growth rates. A partial budgeting approach to evaluate these alternatives would be appropriate if a new heifer nutrition program becomes part of the action plan.

3. Size of replacements at calving

The next section asks for heart girth and height of recently calved heifers. A chart translating inches to estimated weight follows, as well as an estimate of the production impact of additional weight on first lactation yield (Keown, 1986). The economic consequences are calculated relative to a 1200-1250 pound standard post-calving heifer and are multiplied by the number of heifers calving per year.

Culling rates

The direct cost of culling is estimated by subtracting the average price received for cull cows from the current price for springing heifers. This approach ignores other costs, as well as benefits, that can occur with culling.

The annual turnover rate for the dairy is compared to a goal rate of 25% (Rogers, 1988). The difference in excess of 25% is multiplied by the rolling average herd size and then multiplied by the direct transaction cost to estimate the direct cost of culling in excess of goal.

Udder Health

The udder health section focuses on economic losses to mastitis in three areas: subclinical production losses related to somatic cells, subclinical milk price premium losses, and clinical case losses.

1. Production losses due to subclinical mastitis

Production losses due to subclinical mastitis are calculated from herd average somatic cell count (SCC) linear score (Reneau, 1986). For each increased unit of linear score greater than goal, a first lactation cow is assigned a loss of 222 lb. and a mature cow is assigned 444 lb. per lactation.

2. Milk price premiums lost due to high somatic cell counts

Opportunities to generate milk price premiums for lower somatic cell counts are calculated based upon current premiums received versus the maximum offered by the dairy plant. There are situations where the maximum premium is associated with an unrealistic herd SCC. In those situations, select an appropriate SCC goal and premium level and calculate accordingly.

3. Losses due to clinical mastitis

The clinical mastitis section requires an estimate of the number of clinical cases of mastitis per year. These cases would include the full range of clinical cases ranging from a simple tube treatment in one quarter to a coliform death. It is unusual for clients to record this number, and it seems easier to get them to estimate a typical number of clinical cases per month. An annual estimate is made, and the number is multiplied by $107 per case (Hoblet, 1991).

Genetics

Many veterinarians dismiss the details of genetics, as long as the sires are in artificial insemination. Yet this is a profound mistake for a production medicine advisor. In 1995, it is not difficult to pick two groups of bulls out of the available AI offerings that differ in predicted transmitting ability of dollar value (PTA$) by $150. This means that the daughters of one group of bulls can be expected to produce $150 more milk product per lactation than daughters of the other group. The financial impact of semen selection policy can exceed the impact of most of our health programs and should not be overlooked.

The chart in the form shows the average PTA$ value of sires of different age groups of animals at different production levels in Wisconsin (WDHIC, 1993). The PTA$ values are very dynamic for at least three reasons: 1) Yearly progress of the industry and the changing cow population within herds, 2) adjustments of individual bull data as progeny are added to the database, and 3) yearly adjustments of PTA$ due to changes in average annual milk price.

Each year, new proven higher production bulls are added to the studs, resulting in an typical increase of about 20 PTA$ per year for the population of bulls in AI. Over a longer period of a decade, there will be periodic adjustments of the "base", where the increasing PTA indexes are returned to near zero. These base shifts occur every 5 years with the next base shift due in the year 2000.

The dollar value used in PTA$ reflects commercial average annual prices for milk, fat, and protein. For example, commercial milk prices for the year 1991 were significantly lower than 1990 and the PTA$ value of all bulls dropped with the new calculations in January 1992. The formulas used to compute 1991 and 1992 PTA$ (Funk, 1992) follow:

1991 $PTA\$_{MFP} = \$0.04386(PTA_{Milk}) + \$1.18(PTA_{Fat}) + \$1.37(PTA_{Protein})$

1992 $PTA\$_{MFP} = \$0.03664(PTA_{Milk}) + \$1.04(PTA_{Fat}) + \$1.28(PTA_{Protein})$

The important point to remember is that the relative PTA$ of sires used by the industry is quite dynamic and therefore, each version of the Goal-form will be dated within a year because of the genetic section. Most DHI centers analyze the genetic data for their processing center several times each year and they are willing to share this information so you can update your charts.

1. Production losses in cows from lower value AI sires

Potential losses of production are calculated relative to the genetic values being achieved by other high production dairy farms (Wisconsin DHIC, 1995). Deficiencies in this area can be addressed with improved sire selection. The availability of computerized sire selection programs such as BullSearch (Bullsearch, 1995) and MaxBull (Cassell,1992) has made it possible for veterinarians to aid in identifying high performance sires for their clients.

2. Production losses in cows sired by unproven herd bulls

The section on genetic losses from unidentified sires assumes that the sire is an unproven herd bull. Cassell estimates that an average daughter of the average AI bull will produce $134 more product per lactation than an average daughter of an unproven bull (Cassell, 1992). This calculation can stimulate interest in replacement synchronization and AI programs.

Reproduction

Reproduction losses are based upon two aspects of calving interval. If the calving interval is long, that fact will be reflected in an increase in the "average days-in-milk" (ADIM) of the lactating cows, the average length of the dry period, or both.

1. Excess rolling-average-days-in-milk

Herd milk production is estimated to be reduced 0.17 lb. per cow per day of the year for each day the herd averages over 150 ADIM (Grusenmeyer, 1983). The goal-form uses 160 rolling ADIM as a goal, because the author is more comfortable with a 12.3 month calving interval than 12.0 months. It may be appropriate to increase the ADIM goal further for herds that use bovine growth hormone.

The form demands calculation of an annual average of each month's ADIM. It is important to use the rolling 12-month average because inappropriate conclusions about reproductive performance are likely if only a single month's ADIM is used. Seasonal calving herds produce wide swings in ADIM through the year, and a single month value can easily range from 100 to 275 ADIM.

Because the entire herd does not milk for the entire year, the 365 days should be reduced by multiplying by the % days in milk of the herd. If the %Days in milk is not known for a herd, a default value of 85% can be used for most herds.

2. Average days dry

If reproductive performance is poor, it is common for cows to have long dry periods. When average dry days exceeds 60, a penalty of $3.00 per day above 60 is assessed for each mature cow who went through the dry period (Grusenmeyer, 1983).

Nutrition

Average peak milk serves as an indicator of nutrition management. Peak milk is reflective of periparturient health, nutrient adequacy of rations, and feedbunk management. Other indicators such as "income over feed cost" would be useful, but that calculation usually takes considerable time to generate in most situations and it tends to focus the discussion prematurely on input costs and not on overall nutrition management.

The traditional thumb-rule is that each additional pound at peak will increase lactation yield by about 220 lb., while this goal form suggests an additional 333 lb. and 250 lb. per lactation for first and second and greater lactations respectively. These larger numbers were generated from regression formulas based upon Wisconsin DHI data.

Setting a goal in this category is more difficult than the other categories of the form. It is useful to find the rolling herd average most similar to your client and then compare the herd peak milk averages to those expected at that RHA. If peak milks achieved are similar to those expected, simply set a higher peak milk goal that is consistent with a desired RHA. If the peak milks are lower than those expected at the current RHA, setting a substantial increased peak goal is appropriate and a major effort to improve fresh cow performance and peak milk is justified. If the peak milks are higher than expected from the RHA, it may be appropriate to make no increase, or a very modest increase, in peak milk goals. In that situation, fresh cow nutrition is not the limiting factor of overall herd management as the production that should be realized from the high peaks is being lost in other of herd management.

In some herds, peaks of one of the subgroups of 1st lactation cows or older cows will be found to deviate greatly from expected, but the other subgroup does not deviate. In these cases, the relatively "lower" group should be investigated. Low peaks of first lactation cows relative to the older cows may reflect a variety of growing, grouping, or feed delivery problems, whereas low peaks of mature cows may reflect metabolic disease problems, accumulated effects of poor housing and subacute disease, and a variety of feeding management problems.

The total economic opportunities should be calculated, but then modified by subtracting the values from other categories that would by themselves increase peak milk. This avoids "double counting" the opportunities from overlapping categories. The subcategory values generated in "undersize at first calving", "genetics", and "production losses based on linear score" should be subtracted from the initial peak milk opportunities, yielding an estimate of gross opportunities from improving peak milk production.

Areas for Attention

The last page of the goal form begins with space for notes. It is a place to jot down the largest loss items and specific comments relative to herd problems. This listing can be used to guide the goal-setting discussion which follows.

Goals and Plans

Space is provided to write a prioritized list of goals and an initial plan. Goals should be selected with care, and a discussion of goal setting and monitors follows this section. The plan to achieve the goals is usually quite apparent, but in some cases, the plan will begin with diagnostic work to further define the problem. In other instances, the plan will simply be the initiation of a scheduled program. When completed, this section serves as a written agreement to implement a production medicine program.

DESIRABLE CHARACTERISTICS OF GOALS AND MONITORS

Mutuality of goals

Effective production medicine programs begin with a mutual commitment to common goals by the dairy manager and the veterinarian. Veterinarians frequently assume that the goals they desire for herd programs are the same goals that their client has for the herd. It is a mistake to make the assumption. When the veterinarian has a goal of a somatic cell count of 100,000 that is not shared by the client and proceeds to comment on a failure to achieve it, the veterinarian risks being viewed as an irritating nag. The goals of both the dairy manager and the clinician must be mutual and understood by each other.

Expression of goals in economic terms

Veterinarians tend to define production indices in biological terms and speak of somatic cells and days open as if they were as clear a threat as hailstones. Yet our clients may not share our bias and may not fully understand our language. If herd performance indices are converted to their estimated economic consequences, problems can be prioritized in a more logical manner and the resulting goals can become more compelling for our clients.

Prioritized and limited number of goals

Production medicine is an attempt to coordinate and integrate all of the production and health services to a herd. As professionals, we seek thoroughness. However, thoroughness does not require that all problems are addressed simultaneously. We risk attaining nothing when we seek to solve all problems at once. It is the responsibility of a production medicine clinician to help prioritize problems, set goals that are achievable within the constraints of the operation, and develop programs to realize them. The person who can focus on one or two goals will usually achieve them, while the person with 100 goals frequently achieves none.

Monitors that respond promptly to change

When a goal is established, a monitor must be designed to track progress toward that goal. Monitors should be defined to respond to changes within a short time frame. The usefulness of monitors can be confounded by two different time-related phenomena: lag and momentum (Stewart, 1994).

Momentum occurs when much historical data is included in the calculation of the index. A typical example would be any 12-month rolling herd average where the current month index is calculated by averaging the data from the current month with that from the previous 11 months. Because 11/12 of data is historical, the rolling average will not change much even if the current month performance changes dramatically. In other words, 12-month rolling averages have a momentum that is difficult to change. In general, annual rolling averages should be avoided as monitors of current performance.

Lag occurs when there is an extended period of time between an intervention and the measured result. An example of lag in a monitor occurs when a client implements a change in a heifer rearing program in order to reduce the average age at first calving.
If heifer nutrition and parasite control programs are implemented now and followed by earlier breeding, it will be a full year before these improvements are reflected in a reduced calving age. Monitors that lag behind real change should be avoided. In this example, alternative monitors with less lag would be "average age at first breeding", "average age at conception", or "projected age at

calving" of heifers confirmed pregnant. These monitors would provide positive feedback within a couple months after beginning the program.

Task-specific monitors

Monitors should be selected to measure the most critical aspect of achieving a goal. For example, a herd with reproductive problems may have a goal of reducing "average days open". However, if ineffective heat detection is the primary problem resulting in long open days, "average days open" should not be used as a monitor. An appropriate monitor will focus on heat detection efficiency. On a regular basis, the veterinarian might produce a list of the cows eligible to be bred in the next 21 days and track the percentage of the list that is actually inseminated in the time period.

USE OF THE FORM

The intent and limitations of the form need to be clear: the goal form is designed to bring attention to the big opportunities for a dairy and assist in the goal-setting process. The equations in the form produce gross economic estimates of the losses the dairy incurs annually in failing to meet the specified targets. The costs of achieving the goals are not estimated. In this sense, the form is simplistic as an analytical tool. However, attempts to estimate net benefit of achieving a goal usually make the process too unwieldy and extensive to accomplish. A less than precise tool that can be completed in a practical world may be more effective than a precise analysis that is rarely done. The goal form was designed to depend upon data that was readily available on most dairy farms and the process had to take less than three hours to complete. Efforts have been made to avoid "double-billing" or counting the same problem twice.

Because completion of the form takes professional time, veterinary time should not be ignored in pricing this service.. While the approach to fees for a goal setting exercise will be handled differently by each practitioner, the following comment may be helpful. The client benefits from the exercise and for many clients, it will be their first experience in preparing a written goal and plan. The veterinarian also benefits because a common outcome of the discussion is the initiation of new or expanded services. Therefore, part of the time results in "service sales" and clients will object to being charged for listening to a "salesman". Because there are benefits to both parties from the exercise, I found it acceptable to track the time spent in the exercise and bill for half of the professional time.

Table 1. PLAN FOR MANAGEMENT AREA:		
	Should the plan be implemented?	
Consideration:	NO	YES
Potential return	Low	High
Cost to implement	High	Low
Interval to effect	Years	Weeks
Odds of success	Questionable	Certain
Impact of failure	Bankruptcy	Minimal

The discussion of goals and plans usually occur simultaneously. There is a tendency for users of the form to rank problems in order of highest dollar amount and create a goal based on the biggest item. This may be correct sometimes, but the area selected for change should be based upon several considerations which are listed in Table 1. Two examples may be useful. There may be large losses in the mastitis section of the goal form for one client. After some investigation, the problem appears to be due to environmental organisms and the plan would involve increasing the vacuum level to reduce liner slips and the initiation of a predip program. Should the plan be implemented? The potential return is high, the cost to implement the program is minimal, the interval to effect would be weeks or days, the odds of success are good, and the impact of failure would be that things remain as they are now. All considerations say YES, the program should be implemented.

The mastitis section may also yield the largest dollar amount on a neighboring farm. After further investigation, however, this second dairy may have a problem defined as a Staph. aureus problem herd with an inadequate milking system. Modernization of the milking system will cost $25,000 and perhaps 25% of the herd should be culled. In reviewing the "considerations" in the chart above, the potential return may be high as in the earlier example. However, the interval to effect may be months and the odds of success uncertain because of inconsistent milking practices, which suggests a "maybe". However, the cost to implement is very high and the added debt might make the farm vulnerable to bankruptcy if they experienced a poor crop year in addition to their current precarious debt situation. These considerations would make this plan less attractive. In this situation, the client should be advised to consider the decision further, perhaps develop partial budgets to study the issue further, and obtain professional financial advice regarding farm debt management. Perhaps the client should find other areas of the goal form that could yield income more quickly and with lower risk to the operation.

The exercise can be repeated whenever a new overview is justified. However, I believe that an interval of about a year is appropriate.

SUMMARY

Clearly defined goals facilitate the delivery of production medicine programs. Carefully defined monitors that reflect specific tasks and respond in timely fashion can help motivate people to accomplish goals. Time spent with a carefully constructed form to overview major health and production areas serve can as an effective motivator and as a written agreement to address production problems.

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