Using Reproductive Records: Basics of Monitoring

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INTRODUCTION

Sound reproductive management can have tremendous positive effects on profitability and one of the key components of modern dairy production medicine is the analysis of reproductive records. Accurate and reliable on-farm records can help guide producers, veterinarians, and consultants to make better management decisions regarding reproductive management. The majority of cows in the US dairy herd are managed using some form of computerized records system such as DairyComp 305, PCDart, and DHIPlus. Carefully maintained and accurate records that can be analyzed appropriately can help answer questions such as: 1) Where are we now regarding pregnancy production? 2) How have we performed historically? and 3) Where are we headed in the near future?

However, before getting into specific monitors, reports or interpretation, there are some general concepts, concerns and terminology that must be considered. These critical issues have been previously discussed in more detail in previous publications regarding dairy herd monitoring and readers desiring more detailed information should consult these references.[1-4]

TERMINOLOGY

Voluntary waiting period: The period of time set aside after calving that allows for uterine involution and hopefully, the resumption of cyclicity, prior to the initiation of breeding. For most dairies, the VWP is 45-60 days in milk.

Conception risk: The percent of services with known outcomes over a specified period of time that result in a pregnancy, or, alternatively, the number pregnant divided by number inseminated (and subsequently determined to be pregnant or not pregnant) over some time period.

Insemination risk: The percent of eligible cows that are inseminated within a given time frame – usually 21 days. This estimate includes animals inseminated as a result of estrus detection or by timed insemination. This estimate is usually not performed for bull breeding since few dairies observe and record services by a bull.

Pregnancy rate: The percentage of eligible cows that becomes pregnant within a given time frame - usually 21 days. While it is true that heat detection (or insemination risk) and conception risk dramatically impact pregnancy rate, they should not be the basis for calculating pregnancy rate. One does not need to know either metric, per se, but rather, when did conception occur for animals under consideration and how many cows were at risk during each 21-d time period. Hence, pregnancy rate can be calculated for bull pens similarly to AI pens once the entry date into the pen and the date of conception are recorded.

COMMENTS REGARDING SETTING GOALS:

Goals: Goals are target levels of performance toward which producers are trying to achieve. When setting goals, one should follow the S.M.A.R.T. approach and define goals that are specific, measurable, attainable, realistic, and timely. An important concept here is to not set goals that are too lofty and unrealistic. Dairymen should not set 30% as their pregnancy rate goal, at least not initially, if their herd is currently languishing at 12% pregnancy rate. Instead, they should pick a more reasonable improvement level, work to achieve that level of performance, celebrate that accomplishment, and then set a new higher goal. For example, if a dairy herd is currently sitting at a 17% pregnancy rate for the whole herd and is utilizing AI with sporadic use of synchronization protocols and clean-up bulls, one potential goal for reproductive performance may be a 20% pregnancy rate for the herd within the next 9 months by more careful and consistent utilization of timed AI protocols, improved semen handling skills, increased estrus detection efficiency and reduced reliance on natural service sires.

Once goals have been set, one must define the individual components or processes that impact the dairy's ability to reach the previously defined targets and determine how performance will be evaluated. In order to achieve a high pregnancy rate, there are a multitude of processes that must all function properly. Cows must transition well from dry cow to fresh cow with limited negative impact from negative energy balance, metritis, endometritis, etc.; cows must receive their first insemination in a timely manner following the end of the voluntary waiting period and be efficiently reinseminated if pregnancy does not occur; good semen handling and breeding skills should result in a high risk of conception for each insemination; and once pregnancies are created, there should be low risk of embryonic loss or abortion. Each of these aforementioned areas could be described as monitoring parameters, i.e., each one is a measurable factor that contributes to the overall reproduction efficiency goal of a higher pregnancy rate.

Benchmarks: Benchmarks are standards by which others can be measured or compared. Benchmarks are not synonymous with goals. Instead, benchmarks are reported standards that are typically adapted from large data sets. Often, these benchmarks are simply the averages for different monitoring parameters and may be derived by lumping together herds that represent a wide variety of production levels and management philosophies. Unfortunately, many people may use these benchmarks as herd-level goals. These benchmarks become measuring sticks to evaluate their own dairy's performance. Commonly used benchmarks that producers use to evaluate herd reproductive status often include the use of calving interval, average days open, and pregnancy rate. For example, whole herd pregnancy rates typically average about 14% across the U.S. A producer that is currently at 16% pregnancy rate might feel good about his herd's performance as compared to the benchmark of 14%, but based on economic modeling, he is incurring tremendous lost opportunity costs by his inability to achieve a more profitable, yet realistic, level of reproductive efficiency of 20-25%.[5] In the absence of other data, benchmarks can be useful as a starting point for comparison, but who wants to strive to be just average in an economic sense? As a general rule, generic, industry-wide benchmarks are dangerous, and should be avoided, or at the very least, used with extreme caution. A far better approach would be to evaluate their current status, and see if recent changes were harmful or beneficial. Ultimately, producers should set their own herd-specific goals.

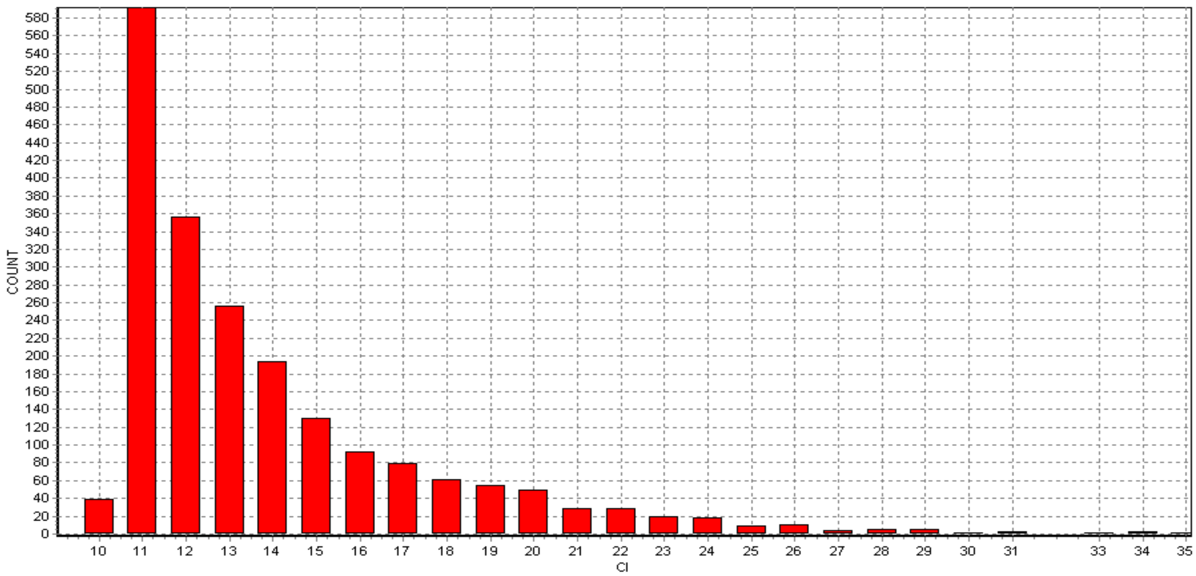
MONITORING ISSUES:

The process of monitoring involves the routine and systematic collection and evaluation of information (monitoring parameters) from a dairy in an attempt to detect change in the process. In general, monitoring is used to measure the effect of some implemented intervention, to detect the occurrence of an unintended disruption in the system process, and to help motivate behavioral change on the dairy by identifying previously unknown or unrecognized issues. Equally important, however, is to use caution with monitoring to avoid changing something when it is not really a problem.

Of course, mistakes can be made in monitoring performance parameters and there are some clearly identified potential pitfalls that should be recognized by professionals involved with dairy performance monitoring including variation, lag, momentum, and bias. The traditional reproductive parameter of calving interval will be used to illustrate the potential issues with each of these pitfalls, but calving interval can be defined in several different ways. Actual historical calving interval refers to the elapsed time from one calving to the next. Therefore, in order to calculate a calving interval, a cow has to calve, be rebred, conceive, maintain the pregnancy, and calve again. Some data processing centers will report a minimum projected calving interval. This overly optimistic version of the calculation projects forward in time by adding a projected gestation length to an estimated days open value for each cow in the herd that is past the voluntary waiting period. Pregnant cows have an actual days open, while cows that have been inseminated but not yet checked are assumed pregnant to determine their days open. For cows that are past the voluntary waiting period but not yet inseminated, it is assumed that they will conceive during the next 21-day period and adds 10 days to their current days in milk to estimate a minimum days open.

Variation: Variation is a concept referring to the amount of change over time. The different ways of calculating calving interval represents one form of variation across the different processing centers. At the herd level, variation can refer to how much difference there is in an outcome across some population. Averages are often used to measure the central tendency for a group but the amount of spread or variation is not apparent and a few outliers can dramatically skew the average. Again, consider the traditional parameter of actual calving interval. Below in figure 1 is a frequency histogram of the actual historical calving intervals for cows in the herd. This herd is currently running a 15% pregnancy rate and the average calving interval is 14.2 months. However, it is very apparent from looking at the graph that there is a lot of variation in calving interval. In this example, over 50% of the cows have a calving interval of 13 months or less and about 13% have a calving interval of over 18 months.

Figure 1. Frequency histogram of the calving intervals for a 3000 cow dairy.



Lag: Lag refers to the elapsed time between when an event occurs and when it is measured. Lag is inherent in many reproductive parameters such as conception risk because we must wait until we can actually determine the outcome of the insemination by either a return to estrus or by pregnancy evaluation. However, the lag for conception risk is only about 30 +/- 10 days depending on the method of outcome determination. In comparison, calving interval has a much longer lag period associated with it. In order for a cow to have an actual calving interval recorded, she must calve, be rebred, and then calve again. This results in a lag of 10-20+ months, depending on how quickly she became pregnant. While some may argue that a lower calving interval is a reasonable goal, it is a very poor monitoring parameter for reproductive management.

Momentum: Momentum refers to the dampening or buffering effect that results from excessive influence of events from the distant past on current performance, i.e., recent changes may be obscured by the weight of historical performance. As a consequence, mistakes may be made in interpretation of performance in either direction. For example, if a herd is using the annual actual calving interval as their reproductive monitor, the herd may not realize that progress is being made reproductively due to the severe dampening effect of months of previous poor performance. Conversely, reproductive efficiency may be declining rapidly, but due to a combination of the severe lag and large impact of momentum, actual calving interval may still look respectable.

Bias: The final of the four major potential pitfalls regarding interpretation of performance records is bias. A bias is a systematic error in the collection, analysis or interpretation of data that can lead to incorrect conclusions. Or, to put it in more simple terms, bias is the incorrect inclusion or exclusion of cows from the parameter calculation. Again, using calving interval as the source of our example shows a biased estimate of reproductive efficiency for the herd since only cows that have calved twice or more are eligible for consideration. First lactation animals are automatically excluded from consideration and older animals are included, but only after calving again. There is no information regarding animals that failed to become pregnant, failed to maintain a pregnancy, or that were culled from the herd. Excluding subpopulations such as these may make the numbers look better but do not adequately evaluate the herd's true performance.

Bias can also be introduced into the evaluation if cow records are incomplete or if assumptions are made regarding pregnancy outcome. For example, historical pregnancy rates can be biased upwards (yielding an incorrect overestimation of performance) by failing to consider cows that were culled as nonpregnant animals. Also, some DHIA systems still use non-return information for the purposes of calculating reproductive efficiency estimates. Cows with a recorded breeding but no follow-up pregnancy determination or additional breedings may be assumed pregnant after a specified period of time. In these herds, the apparent pregnancy rate as reported on the DHIA summary sheet may be approximately three times higher than reality.

EVALUATING REPRODUCTIVE PERFORMANCE

Every dairy consultant has their own approach toward evaluating reproductive performance via dairy herd records. The approach that is presented here is not meant to be all inclusive, nor is it meant to be an "ideal" method, but rather is simply the approach that the author prefers to take when looking at reproductive records on-farm. Illustrations will be made using a combination of PCDart (and Dairy Herd Detective) and DairyComp 305 software graphs and reports. The following outline represents one potential approach to the evaluation of reproductive performance. Unfortunately, it is beyond the scope of this paper to cover each of the following points or to delve into significant details for each topic.

- Understand the herd's objectives regarding its reproductive program
- Verify completeness of the available data
- Evaluate the "true" VWP and the herd's ability to deliver semen in a timely manner for first insemination
- Evaluate the pregnancy rate, ideally from a variety of ways:
    - Whole herd performance over the last year
        - By calendar date
        - By days in milk
    - AI herd vs. natural service (if bulls are used)
    - First lactation vs. 2+ lactation cows
- Evaluate insemination risk using the previous approach (except for bulls)
- Evaluate conception risk
    - Service number, breeding type or code, technician, day of the week, and via a stratified approach if cow numbers and software system allow
- Pregnancy check evaluation – frequency, compliance
- Pregnancy hard count
- Pregnancy losses
- Transition health and management (if data is available)

The first step mentioned in the outline (evaluate the herd's objectives) sounds a bit like an academic issue, but is critical in order to understand the herd's goals, expectations, and willingness to work to improve. For example, some herds want to have the highest possible pregnancy rate and are willing to do whatever it takes to achieve it while other herds don't want to do anything more than deliver 1-2 AI services prior to dumping cows into bull pens. These latter herds do not want to be bothered with the intricacies of managing a timed AI program or investing additional management time or resources towards YOUR reproductive goal for THEIR dairy. If you try to evaluate and manage them toward a very high level of performance, the result is often a painful lesson learned (and a bloodied forehead from constantly hitting the wall!).

Once it is determined that you and the producer are on the same page in terms of the herd's reproductive performance goals and expectations, the next step is to verify the completeness of the data. Screening data for accuracy and completeness may involve reviewing lists of cows, examining histograms or scatter graphs, or by evaluating summary tables.[6] Some key items to consider: 1) Are there at least 365 days worth of culled cow records available?, 2) Has the recent insemination and pregnancy confirmation information been recorded?, 3) Are AI and bull pens individually and accurately defined?, 4) Are the records under consideration limited to only the herd of interest? (i.e., are we actually looking at 2 herds sharing the same data file?), and 5) Have there been any new cows merged into the database recently?

In PCDart, it is preferable to run the analyses using an offload taken from the farm computer. One way to quickly check to see if culled cows are included in the record set is to run the event command (located in the Analysis tab) and select the following events: fresh, preg, sold, died, bred. As shown below, if reasonable numbers are present in each cell, the reviewer has increased confidence that the offload is reasonably complete. Figure 2 shows the result of this command in a herd with complete data while the herd record set for the herd shown in figure 3 (a herd using DC305) is missing the archive data and shows incomplete culling information.

Figure 1. Calving culling and breeding event information.

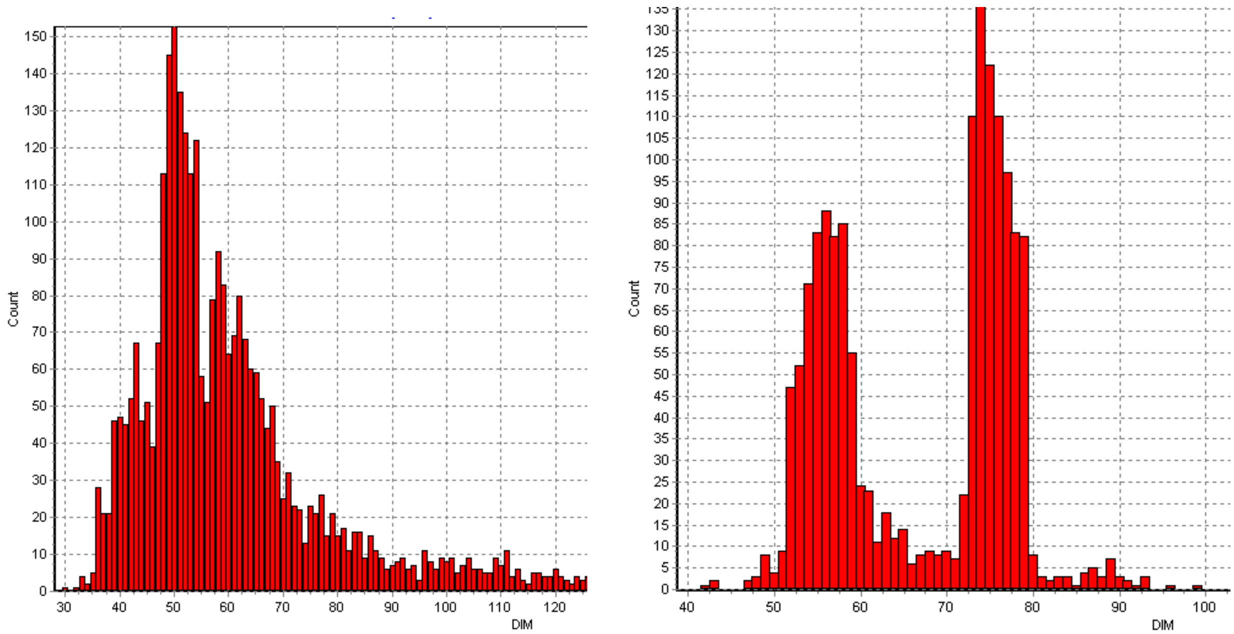
Event Summary: Frequency Table by Month

Event	Total	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	Jan-09	Feb-09**
FRESH	1519	108	88	115	89	142	195	166	145	115	91	148	117
PREG	999	80	94	94	54	69	74	101	121	120	114	78	0
01 SOLD	377	31	14	22	44	26	47	37	33	31	33	19	40
02 DIED	146	12	20	5	11	14	23	8	18	11	14	5	5

Figure 2. Calving and culling information as reported by incomplete data.

Event	Total	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
FRESH	849	110	63	44	45	60	60	75	46	68	111	84	83
SOLD	69	33	25	0	0	0	0	0	0	0	0	0	11
DIED	7	3	2	0	0	0	0	0	0	0	0	0	2
TOTALS	925	146	90	44	45	60	60	75	46	68	111	84	96

Prior to examining the herd's pregnancy rate, one must determine what the true voluntary waiting period is for the herd in order to know when to start "counting". Many herds will state that their voluntary waiting period is "60 days", but in reality, the records show something entirely different. One approach would be to create either a scatter plot or, as shown below in figures 4 and 5, frequency histogram of days to first insemination.

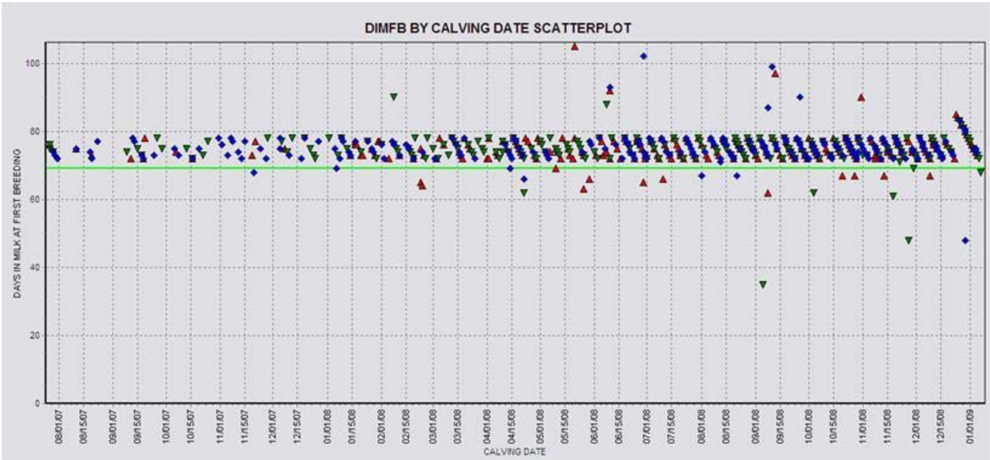


Figures 4 and 5. Frequency histograms of days in milk at first insemination for two herds (herd "A" and "B") with different voluntary waiting periods and management approaches to first insemination .

Comparing the two figures above, it is clearly evident that herd "A" is breeding cows earlier than herd "B" and that herd "B" appears to be utilizing some form of synchronization protocol based on the pattern of first insemination. The true VWP for herd "A" is ~ 40 days (4% of cows have been inseminated by 40 days in milk) while in herd "B", the VWP is ~ 51 days.

As useful as these histograms are, they have lots of momentum within the data that is displayed since they typically display the results of the past 12 months. An alternative approach would be to use a scatter graph of DIM at first breeding by calendar date. This will show both the pattern and whether the VWP has changed over time. Figure 6 is an example of this approach for a southeastern herd. Notice the consistency across time and how this herd has excellent control over first service.

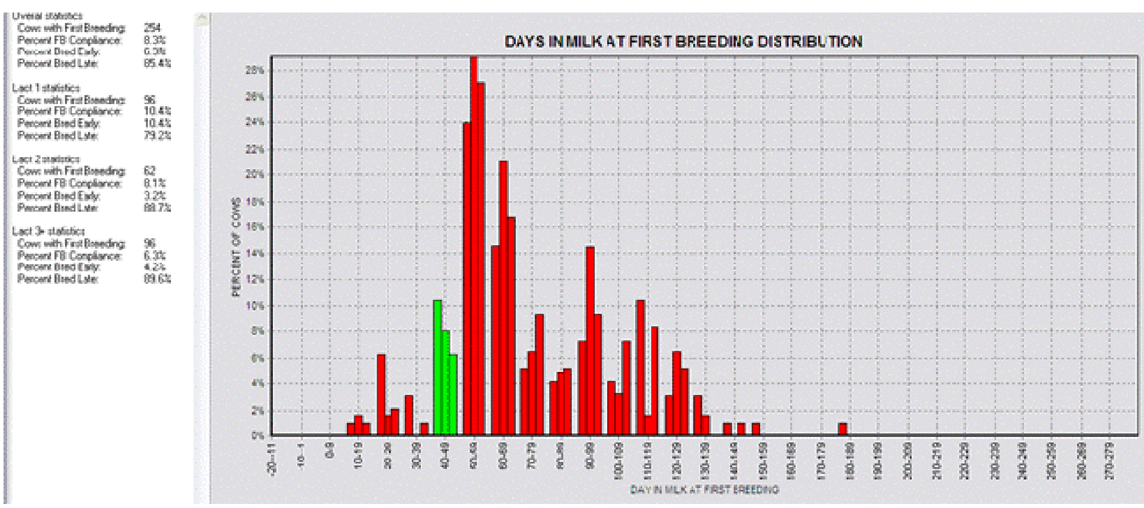
Figure 6. DIM at first insemination by calving date.



Once the true VWP has been established, one can then dig deeper to evaluate the efficiency of delivering the first insemination, either by visual assessment of graphs or by calculation using other commands. In AI herds, I like to determine what percent of cows receive an insemination within a specified period of time following the true VWP. For example, if a herd is using total timed AI on a weekly basis and a VWP of 70 days, I would like to see 90-95% of cows that are 81 DIM or greater with a first insemination between 70 and 77, excluding reproductive culls and cows starting a lactation by abortion. (For herds using TAI every 2 weeks, the window is expanded to 14 days instead of 7.) Referring back to figure 6 again, this herd is doing an excellent job as they have 95% of all cows serviced within a 7-day window of their voluntary waiting period.

On the contrary, examine figure 7 below that illustrates the problems that herds can have when they rely on a poorly run estrus detection program. Cows are inseminated too early and it takes a long time (too much variation) for cows to be inseminated.

Figure 7. Example of a herd with poor control of first insemination.



However, most herds do not utilize total TAI and thus expectations must be modified. In the herd pictured in figure 5, a back-door TAI is utilized after breeding off of heats induced by the second prostaglandin in a Presync program on a weekly schedule. The first major band represents cows bred off of standing heat and the second, taller band represents cows receiving the TAI. In between are the cows that either failed to synchronize or were incorrectly inseminated too early. In this situation, if a herd is enrolling cows on a weekly basis, I like to see 90-95% of cows inseminated within 30 days of the VWP (51+30=81), excluding “do not breed” cows and cows starting lactation by abortion. In this herd’s case, it is performing quite well at 93%.

Once the VWP and efficiency for first service has been evaluated, I like to look at the pregnancy rate. While no single monitor is perfect, I feel that pregnancy rate, when performed correctly, is the single best tool for assessing both historical and ongoing reproductive efficiency in a dairy herd. Pregnancy rate is a metric that evaluates the speed at which cows become pregnant and is calculated most commonly on a 21-d basis by dividing the number of cows that became pregnant during a specific 21-d period by the number of cows considered eligible to become pregnant over the same time period. To be considered eligible during that specific 21-day cycle, cows must be past the VWP, not classified as a “do not breed” cow, not already pregnant, and not pending some unknown outcome. Eligibility does not refer to whether an animal is cycling or not.

I typically start my evaluation of pregnancy rate by calculating the pregnancy rate over the recent past few months, using the estimated voluntary waiting period as calculated above. When working with DC305, I like to look at the preg rate for AI only, bull only, and the combined preg rate. When working with PCDart herds, currently, we are limited to only looking at the whole herd all together.

Figure 8 displays the results of the 9-month calculation of preg rates for a southeastern herd, arranged by calendar days (from PCDart report # 126) and figure 9 represents the same info, arranged by DIM categories. In both reports, the pregnancy rate is similar (21 and 22). While each report is looking at the same data, occasionally, there are very small differences in the calculated population at risk, leading to slight differences in the cumulative preg rate.

Last Date of	---------- Heats ----------			------- Pregnancies -------		
21 Days	#Eligible	#Observed	%Obs	#Eligible	#Reported	Rate
07-12-2008	271	136	50	259	38	15
08-02-2008	260	113	43	237	41	17
08-23-2008	245	108	44	209	30	14
09-13-2008	269	141	52	238	46	19
10-04-2008	255	129	51	240	50	21
10-25-2008	256	136	53	241	52	22
11-15-2008	250	130	52	236	57	24
12-06-2008	246	124	50	217	47	22
12-27-2008	267	150	56	226	61	27
01-17-2009	279	160	57	245	66	27
02-07-2009	277	152	55	0	0	
02-28-2009	300	168	56	0	0	
03-21-2009	339	137	40	0	0	
Total	3514	1784	51	2348	488	21

Figure 8. 9-month pregnancy rate report, organized by calendar date.

Figure 9. 9-month pregnancy rate report by DIM categories following a 72-d voluntary waiting period.

Days In Milk (DIM)	Heats #Eligible	Heats #Observed	Heats %Obs	Pregnancies #Eligible	Pregnancies #Reported	Pregnancies Rate
1-30	0	0		0	0	
31-51	0	0		0	0	
52-72	2	2	100	2	0	
73-93	800	764	96	564	236	42
94-114	444	214	48	299	66	22
115-135	323	204	63	218	42	19
136-156	247	130	53	184	32	17
157-177	196	123	63	152	30	20
178-198	164	61	37	129	13	10
199-219	144	73	51	115	25	22
220-240	119	49	41	93	13	14
241-261	101	35	35	78	5	6
262-282	97	31	32	75	5	7
283-303	88	21	24	58	6	10
304-324	76	12	16	42	5	12
325-345	61	12	20	35	4	11
346-366	45	5	11	31	2	6
>366	269	4	1	168	0	
Total	3176	1740	55	2243	484	22

Overall, this herd is doing a very good job over this 9-month period. In general, a reasonable preg rate goal should be to get the herd's cumulative, annualized preg into the mid 20's. At 24 to 25% preg rate, most of the value to be derived from reproductive performance has been achieved. However, a word of caution is in order here. The herd pictured in Figures 8 and 9 has a 72-d voluntary waiting period. For herds that delay breeding to 70-80 or more DIM, the calculated preg rate must be significantly higher at this later starting point in order to generate a similar number of pregnancies as a similar herd that starts breeding a 50-60 DIM. For example, in this herd with a 21-22% cumulative average preg rate, approximately 485 pregnancies are generated over this time span. If this herd had maintained the same cycle-specific performance for cycles starting at 73 DIM, but added an additional cycle of breeding prior to this level with an average preg rate of 15-17%, the calculated preg rate would be approximately 20%, but an additional 10-15 pregnancies could have been generated.

Figure 9 displays the impact of timed AI on pregnancy production. During the first real cycle, 96% of eligible cows were inseminated resulting in a first cycle preg rate of 42%. Afterwards, the 21-d preg rate per cycle settled back into more typical levels of upper teens to low 20's.

Following an examination of preg rate, one should look at conception risk information. PCDart has several alternatives for examining conception risk (reports # 094 and 106). I will not go into full detail on evaluation of conception risk, but rather will illustrate a few concepts using the results shown in Table 1.

Table 1. Conception risk results for first service arranged by breeding trigger.

Trigger	# Svc	#Suc	%Suc
Mounting	20	7	35%
Chalk/Paint	45	9	20%
Timed AI	96	25	26%
Totals	161	41	25%

Table 1 displays the first service conception risk information from a southeastern herd. Statistically speaking, there are not enough numbers to confidently state that the conception risk results between the 3 breeding triggers are different. There are many potential confounders that might impact the conception risk results of each of the three recorded breeding codes such as AI technicians, season of the year, lactation number for cows in each group, etc. However, if we assume that the trends represent the general pattern of results and only 1 technician was involved, one possible interpretation might be that 1) it appears that if cows are accurately detected in heat, semen can be delivered successfully as evidenced by the 35% conception risk for mounting cows, 2) inaccurate heat detection might be leading to conception risk issues (as evidenced by the lowest conception risk in the chalk/ paint category), and 3) either compliance issues or possibly cyclicity challenges are most likely impacting the timed AI conception risk results. Again, I must emphasize that there are not enough numbers in this very small data set to make any certain conclusions, but this illustration merely shows one approach or way of thinking in terms of evaluating conception risk results.

In many herds in the U.S., there are often insufficient numbers of inseminations to adequately and correctly draw statistically correct conclusions about conception risk once it is stratified by lactation, times bred, technician, etc. I have heard stories of dairy managers changing insemination technicians based on a 7-8% difference in apparent conception risk. Statistically speaking, in order to have full confidence (95% confidence interval) that the differences are indeed real, there must be ~ 750 cows per breeding group in order to confidently say that 42% CR by technician 1 is indeed different than the 35% CR by technician 2. Also, make sure that if sufficient numbers are available, that you are comparing apples to apples and not apples to oranges. For example, if I want to compare the performance of the aforementioned technicians, I must make sure that they are actually breeding the same types of cows (first lactation, for example) and that one is not cherry picking certain cows. How many herds do you know that have enough first lactation animals that are bred for the first time during the summer heat stress period to make up two groups of 750+ animals each? In reality, this is very difficult to achieve, and while few herds are interested in the 95% confidence interval prior to making a change, the point is made that caution should be observed prior to firing someone that may in fact be doing a reasonable job.

Also, if a new technician is hired, there must be sufficient time elapsed before an evaluation is possible. Conception risk is determined using inseminations with known outcomes. Whenever a new technician starts, his or her early conception risk numbers are biased downward since you gain information about negative outcomes (conception failure) earlier via cows returning to heat than positive outcomes (pregnancies) due to differences in the lag time for outcome determination.

An alternative reproductive monitoring approach that has gained in popularity is the concept of pregnancy hard counts or pregnancy inventory. The basis for this approach is that in order for a herd to maintain itself in cow numbers, a minimum number of pregnancies (and therefore future calvings) per month is necessary to replace cows that are culled, sold, or that may die. For most non-seasonal, stable herds (not expanding or contracting in size) with typical culling risks, approximately 10% of the lactating herd should calve each month. This estimate can be derived by dividing the total cow herd inventory (milking and dry) by the actual calving interval. For example, in a herd with 1600 total cows and a 13.5 actual calving interval, ~ 120 calvings per month are needed. In order to end up with 120 calvings, we must account for the culling of pregnant cows and the pregnancy loss. If 10% of pregnancies are lost to abortion and 2% of pregnant cows are culled, we must adjust by a total of about 12%. In this case, 120/ (1-.12) = 136 pregnancies must be created per month, including heifer replacements and lactating cows. If the culling risk for the lactating herd is 33%, then the herd must provide 33% of the pregnancies by heifer replacements and the rest by the milking cow herd, resulting in approximately 91 pregnancies needed from the cow herd per month to maintain a stable herd size, or about 21 pregnancies per week. In order to create 21 pregnancies per week in a herd with a conception risk of 30%, about 70 cows should be inseminated per week. Some farms have found that pregnancy hard counts used in this manner may be beneficial as a longer term goal to help address the roller coaster calving patterns that are often present (and the resulting strain that these patterns may place on transition cow facilities and management).

In much of the southeast, summer heat stress conditions preclude herds from maintaining a consistent flow of pregnancies. To account for this issue, the above example must be modified to consider approximately 8 months of time at risk to generate the same number of pregnancies. Therefore, we need about 50% more pregnancies per month over the limited breeding period of 8 months as would be needed if pregnancies could be consistently produced over the full 12 month period of time.

Unfortunately, there are a number of weaknesses with this approach. First, it does not consider the number of eligible cows. It is rare to find a herd with a stable number of non-pregnant cows year-round. Second, it sometimes provides inseminators the assumption that we must breed “X” number of cows this week, irrespective of the population at risk for breeding. Third, this number ignores the impact of early pregnancy diagnosis and pregnancy wastage. Pregnancy rate is better for day-to-day monitoring of performance with the pregnancy hard count approach being a useful evaluation to help forecast any potential holes in the projected calving inventory.

Another facet of reproductive management that must not be forgotten is the problem of pregnancy wastage and its potential impact on reproductive efficiency. Pregnancies that are lost prior to ~ day 40 post-breeding are termed embryonic loss and losses that occur after day 40 are termed abortions. A herd’s apparent conception risk can look better or worse depending upon how early pregnancy diagnosis is conducted. For herds utilizing ultrasound and recording early pregnancy outcomes, the apparent conception risk (and pregnancy rates and counts) as well as risk of pregnancy loss could potentially be falsely elevated depending upon how these early results are handled by the software program and by the nomenclature used by the farm. Perhaps we should only utilize early exams with ultrasound or blood testing as “open” cow checks and reserve the pregnancy check for closer to 40 days post-breeding.

Monitoring dairy herd reproductive performance need not be a complicated, daunting task, but a little preparation can ensure that the correct performance indicators are used correctly. Of course, this may mean changing the monitoring parameters that have been used in the past. Short (low) calving intervals and reduced days-open are legitimate goals for dairies, but these outcomes should not be used as key monitoring parameters due to the previously mentioned problems such as lag, momentum, bias and variation. Instead, focus on a few key areas such as first service insemination efficiency, re-insemination of non-pregnant cows in a timely manner, optimizing rather than maximizing conception risk, and transitioning cows in a healthy manner. With an eye on these key areas, carefully maintained and accurate records that can be analyzed appropriately can determine historical reproductive performance, current status of pregnancy generation, and may help give some guidance to where the dairy is headed in the near future. Although there is no one perfect reproductive parameter, whole herd pregnancy rate, when calculated and used correctly, provides the most information regarding overall performance and should be the basis for evaluating dairy herd reproductive efficiency.

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