



**DAIRY &
ANIMAL
SCIENCE**

**DAIRY
DIGEST**

Innovative Business Arrangements – Cooperative Farming

In the first article of this series, a foundation was laid for the usefulness of incorporating innovative business arrangements into existing dairy businesses. Let’s now begin the series of discussions on the various possible arrangements with the topic of cooperative farming.

Cooperative farming is some type of arrangement where the individual farm organizations are maintained, but where two or more producers agree to work together to attain greater efficiency and profitability. These arrangements can take numerous forms. The decision as to what arrangement to undertake will depend on the producers involved and what their needs are.

The term cooperative farming is not meant to conjure up the images of communist-style collective farms. Rather, it should be thought of as an arrangement where two or more producers decide to work together with the purpose of increasing their efficiency or obtaining benefits, such as milk premiums, for instance, that they would be unable to acquire individually.

You may ask the question “why not form a partnership?” A partnership is a formal business arrangement that would require that the persons entering into it contribute their business assets to the partnership, in effect giving up individual ownership. A cooperative farming arrangement on the other hand can allow the producers to work together in the parts of their businesses that they feel would be beneficial, but still retain individual ownership of their respective businesses.

Let’s turn now to a discussion on group farming, a type of cooperative farming, as it could pertain to dairy producers. Imagine three producers all with somewhat small herds each

located within a twenty-mile radius of each other. Individually, these producers do not make enough milk to fill a tanker daily. However, they have calculated that collectively, their cows would produce enough milk to fill a tanker each day. Being able to accomplish this would give the producers some leverage with which to negotiate a contract to have their milk hauled to a market where a higher milk price would be received.

The producers’ goal is to receive a higher milk price. Now they need to decide how to go about making it possible. Much of what they decide will depend upon each producer’s level of comfort with a cooperative arrangement and amount of control they wish to retain. Asking the questions posed in the first article of this series should provide the answers they need to make a decision with which all are comfortable.

It occurs to the three producers that they have two options; (1) negotiate an agreement with their milk hauler (assuming they use the same one) whereby the milk is picked up from each farm, but upon arrival at the processor, it is viewed as coming from one farm and thus they are paid as a group, or (2) each contribute an appropriate percentage for the construction of new housing and milking facilities where all the milk cows would be kept and milked together. This would add the additional advantage of making the milking enterprise more efficient (and probably more profitable) than three smaller individual enterprises.

In deciding which option to choose, the producers will need to assess their long-term goals, capacity to invest in a new milking center, and personal comfort level

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with the option. In the example presented above, in either case the producers will need to formulate a way to divide the revenue from milk sales between them in a fair and equitable fashion. Option 1 appears to be the simplest to implement if they can find a hauler and processor agreeable to this type of arrangement. That option is also the easiest to terminate as the individuals have not invested in a larger facility used by all parties. Option 2, on the other hand, provides the advantages of providing additional cost savings and further cooperative labor activities. If the group is looking for long-term arrangements, this may be the way to go.

Other types of cooperative farming arrangements include:

- A group of producers each owning one or two pieces of equipment or machinery needed to do a task, such as for crop work, rather than each owning everything that was needed. The producers would then each have access to all the pieces of equipment. And,
- a group of producers coming to an arrangement whereby one (or more, depending on the number in the group) producer was responsible for all the activities within a particular enterprise for all the farms.

Other forms of cooperative farming arrangements can probably be put into place. Those producers looking for a way to become more efficient and profitable should take the time to look “outside the box” to see if there’s an innovative farming arrangement that could work for them. Keep in mind that anyone considering a cooperative arrangement should carefully analyze the advantages and disadvantages of all options.

The next article in the series will focus on buying and marketing clubs, two additional innovative arrangements that can be used to enhance profitability.

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Where is your manure?

It’s September 20th, do you know where your manure is? There is a lot of talk about manure storage and handling. Should I have a solids separator? What kind of pumps should I buy? The list of decisions is endless. But the components are only the beginning. The best components are no good if they are not put together in a complete system that is suitable for your farm. Some methods and machines might work well in hot dry climates but not in cold humid ones.

Today’s manure systems take more than knowing how to start and stop a tractor and drive in a straight line with a manure spreader. Manure in any system is still a potential pollutant. Applying too much manure on a field will defeat the purpose of a well-designed handling system. Leaking pipelines or valves that allow manure to run into streams can quickly compromise an otherwise good plan. An earthen manure storage structure that’s riddled with woodchuck holes will allow a manure release sooner or later.

To assure that manure is where you want it to be you must have a good system with proper management and maintenance. Word of mouth is not an adequate method to assure that all workers operate a system correctly and respond to problems appropriately. A written operating plan complete with standard operating procedures (SOP) for use by all operators is a must. Good field maps identifying manure application areas and logbooks are necessary to keep track of where, when and how much manure is applied.

You can’t be sure your manure is where you think it is without regular observation. **Self-monitoring, reporting and record keeping** is how the PA DEP describes this and suggests weekly inspections of manure storage and handling systems. Inspection every two weeks and after measurable wet weather events is required for permit holders. What and where to inspect will depend on your system. These inspections should be documented (written down) and if you are a CAFO operator reported to DEP. *“The inspections, at a minimum, shall include evaluation of the adequacy, stability, and operation of the manure storage facilities, the continued operation and adequacy of BMPs, Erosion and Sediment Control Plans and where required the Preparedness, Prevention and Contingency (PPC) Plan.”* This information is recorded and any problems identified, corrected and a record made of this activity. In simple terms, self-monitoring means the owner/operator is responsible to assure that the manure system is maintained and operated in an environmentally secure manner. Are you sure you know where your manure is?

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Increasing dietary P above NRC (2001) recommendations does not improve reproductive performance

The widespread notion that adding P to the dairy diet improves reproductive performance is the most important factor that has contributed to excessive P supplementation in modern dairy production systems. However, there has been no research data to substantiate this practice. In a past issue of Dairy Digest (June, 2000) research results were discussed that concluded that feeding P above NRC recommendations (.36-.38%) does not affect milk yield or reproductive performance.

During the recent American Dairy Science Association annual meeting (2002), research results were presented comparing the reproductive performance of lactating cows fed P at NRC recommended level or higher. The study was conducted by Lopez et al. (2002) at University of Wisconsin, Madison and US Dairy Forage Research Center, USDA-ARS, Madison. The trial involved 267 Holstein cows randomly assigned to receive either 0.37% or 0.57% dietary P (DM basis) starting at calving. Estrous behavior was monitored and cows bred at natural estrus from 50 to 100 days in milk and to synchronized estrus if still open after 100 days in milk. The reproductive performance results presented at the meeting are in Table 1. **Continued on Page 3**

Table 1. Reproductive parameters for cows fed diets containing 0.37% or 0.57% P

| Item0 | Dietary P (% DM) | | P |
|---|------------------|--------------|------|
| | .37 (n=134) | 0.57 (n=133) | |
| Days to 1 st estrus ¹ | 68 | 67 | 0.87 |
| Days to 1 st AI | 89 | 90 | 0.87 |
| Days open | 112 | 116 | 0.45 |
| Services/conception | 2.9 | 2.6 | 0.35 |
| Conception rate % | | | |
| 1 st service | 39 | 42 | 0.67 |
| Overall | 29 | 32 | 0.47 |
| Pregnancy loss (30-60 d) % | 15 | 16 | 0.83 |

¹First natural estrus detected between 50 and 100 days after calving.

The results of this recent study clearly show that P levels of 0.37% or 0.57% did not result in detectable differences in reproductive performance. These results are in agreement with previous studies (Table 2) that also showed that supplemental P does not enhance reproductive performance of cows.

Table 2. Reproductive performance: Summary of 10 trials

| Item | Dietary P (% of DM) | | | |
|--------------------------------|----------------------|------|----------------------|------|
| | 0.32-0.40 (n=393) | SD | 0.39-0.61 (n=392) | SD |
| Days to 1 st estrus | 46.8 | 10.9 | 51.6 | 13.8 |
| Days to 1 st AI | 71.7 | 16.2 | 74.3 | 10.6 |
| Days open | 103.5 | 21.4 | 102.1 | 13.0 |
| Services per conception | 2.2 | 0.9 | 2.0 | 0.5 |
| Pregnancy rate % | 92 | 6.0 | 85 | 5.0 |

It appears that the current prevalent notion that increasing dietary P for lactating dairy cows improves reproductive performance may have arisen as a result of earlier reports of improved reproductive performance following P supplementation of cattle grazing poor quality pastures with 0.15% P. A survey conducted in England in the 1950's involving various farms also reported improved conception rates when herds with poor forage and no grain diets received P supplementation. What is often forgotten is that modern dairy diets rarely contain low levels of P comparable to those represented in these earlier studies. The levels of dietary P in these early studies were much below the NRC (2001) requirements and probably did not provide adequate P for rumen microbial growth. Low P levels below 0.25% may be deficient for ruminal microorganisms, leading to decreased diet digestibility and lowered microbial protein production. The end result would be reduced energy and protein supply that may indirectly influence reproductive performance. The low P effect on reproductive performance is therefore a secondary effect of reduced availability of protein and energy required for reproductive function.

In summary, the implications that can be drawn from the recent studies are that feeding lactating dairy cows dietary phosphorus higher than the NRC (2001) recommendations does not enhance reproductive performance. The reduction of

phosphorus in dairy diets to the NRC recommended levels will not only decrease costs for the dairy production system but will also reduce environmental pollution by decreasing manure P levels.

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Dealing with Forage Nitrates

With the recent drought conditions across Pennsylvania, and the rest of the country, producers need to be aware of the increased risk of nitrate accumulation in their harvested corn and sorghum. Nitrate is a nonprotein nitrogen compound used by plants to synthesize proteins. When plant nitrate is consumed by a cow, rumen microbes convert it to nitrite and ultimately ammonia, again for use in microbial protein synthesis. If excessive nitrite accumulates in the rumen, it will cross into blood and react with hemoglobin in the cow's red blood cells. Nitrite binds to hemoglobin to form methemoglobin and preventing oxygen transfer. Intoxicated cows will show signs of respiratory distress, weakness and ultimately acute death within 1-4 hours of consuming forage with excess nitrate. If the consumed dosage is not enough to cause death, abortions within 2 to 3 days may occur. Animals can be treated, if found early in the disease process. Diagnosis of nitrate toxicosis can be made on dead animals by the dark, "chocolate-colored" blood and measured nitrite concentrations in eye fluids. Eye fluid can be used up to 48 hours after death for diagnosis. The following are recommendations on minimizing your risk with nitrate intoxication.

Analyze high risk forages (corn, sorghum, oats, other cereal grains) grown under drought, low light levels, high nutrient loading or premature frost conditions for nitrates prior to feeding. Do NOT feed green chopped corn that has been stored overnight as it will have the highest potential for nitrate toxicity. Preserve high-risk forages as silage, not as hay. The ensiling process reduces nitrate levels by over 30 to 50%. Minimize nitrogen addition to corn silage as fertilizer prior to harvest or as urea or anhydrous ammonia to increase protein content. Forages high in nitrate will already have very high soluble protein levels. Change feeds gradually, especially when the new feed is suspected of containing nitrates. Mix (dilute) high-nitrate forages with low-nitrate forages. Provide a well-balanced feed program. Healthy animals on balanced rations are better able to tolerate nitrates than under-fed animals. If feasible, cut silage corn subjected to drought high (10-12 in) above the ground. The highest level of nitrate in the plant is in the base of the stem or stalk. Test your water supply for nitrates.

More detailed information on nitrate toxicosis can be found at the PSU Dairy Cattle Nutrition website:
<<http://www.das.psu.edu/dcn/catforg/DAS/pdf/nitrate.pdf>>

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Nutrient management: Friend or Foe

It is not surprising that many producers do not have nutrient management on their radar screens. Putting together a plan can be as intimidating and overwhelming as trying to do your own income taxes. Why would a person put themselves through that ordeal if they didn't have to? The initial response would most likely be there is no good reason. However, even if a farm does not need a nutrient management plan, learning about the many management strategies that can be painlessly implemented, and that comply with regulations currently in place could offer several advantages. In many instances, there are opportunities to lower costs (i.e. feed) on the farm while at the same time maintaining or improving production. There is the possibility to improve the whole farm nutrient balance and the public's perception of farming. Consider the following questions.

1. Are lowering feed costs and improving air and water quality at the same time realistic?

Phosphorus and nitrogen are the two main elements that are concerns regarding water and air quality. They are also the same two nutrients that tend to be overfed on farms and can increase feed costs substantially. In the current situation of higher feed costs and lower milk prices, this could be the time to seriously evaluate the level of phosphorus and protein being fed. The first step in being good environmental stewards is to reduce the excretion of these elements in the manure.

2. What is the P-index?

It is very likely in the next couple of years, phosphorus based nutrient management planning, instead of nitrogen based, will be in place. The phosphorus index or P-index is a tool which evaluates the fields on which manure will be applied. It incorporates a rating system for nutrient transport factors (i.e. erosion) and source factors. Using the P-index scale, determinations will be made if nutrients (manure or fertilizer) can be applied based on nitrogen, based on phosphorus crop removal, or if no phosphorus can be applied.

3. Is there any financial assistance available?

There are numerous cost-sharing programs available that provide assistance to producers. Recently, the federal government has allotted funds that can be used towards environmental improvements.

4. How do I know if regulations apply to me?

The "Foe" for most people lies in the regulation part of nutrient management. The key to finding out if you are in compliance or what direction you need to be going in is by first contacting the right people.

5. How can I become environmentally aware?

The PEACCE program (Pennsylvania Environmental Agricultural Conservation Certification of Excellence) was developed to *promote* environmentally safe agricultural practices among livestock and poultry

producers, to encourage them to minimize risks to the environment and in turn minimize personal liability. By successfully completing three components of the program, producers get *recognized* who meet or exceed standards as established by PEACCE. They receive a farm sign and are publicly recognized for meeting and exceeding the environmental standards of the program.

More in-depth answers to these questions will occur at the Dairy-PR workshops scheduled at various locations across the state on September 24, October 3 and 16, 2002. The registration fee is \$10 per person. The registration fee is offset by funding from the PEACCE program. Detailed information can be obtained by contacting Virginia Ishler at vishler@psu.edu or 814-863-3912.

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TMR Feeding Management and Control Points

Feeding management is a critical part of using total mixed rations (TMRs) providing a complete nutritional program for your cows. TMRs were instituted for many reasons, however two primary nutritional reasons were to eliminate sorting of feeds and to allow accurate determination of dry matter intake. To control these two fundamental principles, several aspects of feeding must be monitored and evaluated routinely.

Elimination of sorting (individual cows eating only select of feeds instead of all feeds) is the goal of a true TMR and is essential to feeding balanced rations. However, the TMR needs to be well mixed, must not separate after mixing, and should discourage sorting during the day. The control point for monitoring sorting is TMR particle size distribution. First, sample several places within the bunk immediately after feeding to evaluate TMR mixing. Return 4 to 8 hours after feeding for another set of samples, and then measure refusals before the following day's feeding. This series of samples will allow you to determine if cows are sorting during the day and over a 24-hour period. If you find greater than 5% difference in particle size distribution of samples taken during the day, sorting is probably occurring, which can easily lead to short periods of rumen acidosis. If particle size distribution of refusals is vastly different from what was fed, sorting and forage quality are likely a problem. You may find one or both of these sorting problems with the same TMR. Finding only a small amount of unpalatable feed left in the feed bunk could also indicate offering too little feed and therefore limiting dry

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matter intake. These sorting control points need to be measured on a regular basis, the timing of which is likely determined by major ration changes or feedstuff changes.

The next control point is determining daily DMI of individual cows or average DMI of groups. For best results, be sure to determine that the TMR is properly mixed and not being sorted before monitoring DMI. Keeping up with DMI is necessary to maintain a balanced ration, especially for protein and energy, which are the two nutrients needed in greatest amounts and are critical for production and maintenance of body weight. Underfeeding either will result in decreased production; while overfeeding either will result in unnecessary feed costs and wasting of nutrients.

To determine DMI you must know feed and forage dry matters. The critical feedstuff that will change in dry matter content most often is silage. The frequency of silage dry matter checks is related to the storage structure used and the amount used out of the structure per day. I recommend checking dry matters twice a week with some variance made for the structure and known silage variability. For example, corn silage made in a short period of time and stored in a bunker silo is likely to have little variability in dry matter from week to week. Haycrop silage harvested from several small fields and stored in a bag-type silo is likely to have great dry matter variability from day to day as material from different fields is fed. Forage dry matter should be determined at least twice weekly when using corn silage or haylage. Sampling should be done more often at the beginning and end of each silo where changes are the greatest.

Routine evaluation of particle size distribution, DMI, and forage dry matter will help maximize the benefits of TMRs and help you meet the nutritional needs of your cows.

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Adjusting Photoperiod for Dairy Cattle

Photoperiod is a term used to describe the duration of light and darkness within a 24-hour period. Seasonal breeders change their breeding behaviors according to photoperiods. Animals that are not seasonal breeders, like dairy cows, are also affected by photoperiod. There have been an increasing number of studies reported regarding photoperiod in dairy cattle. Some of the studies determined the effect of changing the length of photoperiod during lactation, and some during the dry period. The data seem to point in one direction. Photoperiod is for real!

Photoperiod during lactation or the dry period: Dahl et al. (2000 J. Dairy Sci. 83:885) summarized 9 research experiments and one survey study involving exposing lactating dairy cows to a short day photoperiod (SDPP) or a long day photoperiod (LDPP). A total of 800 cows were used in the studies and 1538 herds were used in the survey. The average light period was 10 h for SDPP and 17 h for LDPP.

Cows produced 4.4 lb/d more milk on average when exposed to LDPP than to SDPP.

For dry cows, it has been found to be more beneficial to keep the light hours to a shorter period, and to have more dark hours. Miller et al. (2000. J. Dairy Sci. 83:962) compared SDPP (8 h light: 16 h dark) and LDPP (16 h light: 8 h dark) during the 60-d dry period using 34 cows. After freshening, all cows moved into the regular milking herd on a natural photoperiod (10 h light: 14 h dark). Cows on SDPP during their dry period produced 7 lb/d more milk during lactation than those on LDPP. Apparently, after receiving SDPP during the dry period, cows more aggressively responded to LDPP treatment during lactation than when they were exposed to LDPP during the dry period.

At the recent ADSA meeting, Auchtung et al. (2002. J. Dairy Sci. 85, Suppl. 1:21) reported a study on short day photoperiod. They exposed Holstein steers to either SDPP (8 h light: 16 h dark) or LDPP (16 h light: 8 h dark) for 9 weeks, then switched them to the opposite program. Lymphocyte levels in the blood were greater for SDPP in both periods than for LDPP. They concluded that short day photoperiod improves immune function by increasing lymphocyte activity.

How does it work?

The periods of light and darkness act upon receptors in the pineal gland, stimulating many responses. In the dairy cow, the three primary substances affected by photoperiod are IGF-I, prolactin, and melatonin. IGF-I is released in response to light, and melatonin to darkness. As the circulating levels of melatonin increase, the levels of prolactin and IGF-I decrease.

Cows exposed to LDPP have a consistently higher concentration of IGF-I in plasma (Dahl et al., 2000. J. Dairy Sci. 83:885). IGF-I is the same substance that is stimulated by bST injections. Interestingly, the effect of LDPP and bST may be additive, meaning that one does not replace the other. If you use both methods, you may get a greater milk yield response than by using just one. A LDPP is also associated with increased levels of prolactin, which is important to milk secretion.

As mentioned, Auchtung et al. (2002. J. Dairy Sci. 85, Suppl. 1:21) concluded that SDPP increases immune function in dairy cattle. It is possible that circulating melatonin is what affects the immune system. According to Maestroni (www.photobiology.com), when SDPP signals the release of melatonin, immune system components such as T-Helper cells, cytokines, and phagocytes increase in number and responsiveness. These cells are among the first to respond to a viral or bacterial invasion. This bolstering of the immune system appears to allow animals to better handle stressful situations such as calving, entering the milking herd, mastitis infections, and feed changes.

Where and How Much?

To implement LDPP, lights should be placed throughout the housing area, as well as the feed bunk area. Cows spend a lot

of time lying down in stalls. Even though they are not eating, the effect of light can still be realized.

Some producers may have a tendency to think, "if 18 hours of light is good, 24 hour lighting will be even better, right"? Wrong. The benefits of manipulating the photoperiod hinge on the fact that at some point, darkness is signaled. This allows the animal to measure day length. Without this signal, the cow tends to revert back to a natural SDPP rhythm. This means minimizing all light sources during the selected hours of darkness. Cows do not need a "nightlight" to see the feed

bunk or waterers. They can maneuver in the darkness to eat and drink. Try to chose and place lights so that they provide about 20-foot candles of light at the cow level. The minimum intensity is about 15-foot candles, with no additional benefits seen above 20. When installing a lighting system, contact your local extension office, or an Ag engineer to assist you in measuring for lights and placement.

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Hispanic Workforce Management: Achieving Success for Farm Businesses and Farm Workers

Farm managers employing Hispanic or multicultural workforces will want to be present for one of the 2003 Hispanic Workforce Management Conferences sponsored by Cornell and Penn State Universities. Building on the success of the 2001 conference, the 2003 conference features a dynamic program and nationally prominent speakers who will offer useful insight into practices and attitudes that will help ensure success with a multicultural workforce. Featured topics include:

- Examining Your Business Culture: What tangible and intangible factors determine if your business is a good place to work?
- Understanding Hispanic Cultures
- Management Development: How can I help my best Hispanic employees move into supervisory positions?
- Expanding Employee Skill Sets: Moving your workers into different parts of the operation.
- Language Barriers: How can I best overcome them?
- Community Acceptance and Relationships: What can I do to help my local community accept this new and necessary workforce?
- Legal Issues: Can I alter my workers' status?

In addition to meeting and talking with speakers, conference participants will have the opportunity to meet and compare management strategies with other successful farm business managers. This year, the conference will take place in two locations. The Pennsylvania site will be January 28-29, 2003 at the Grantville/Hershey Holliday Inn, Grantville, PA and the New York site will be January 30-31, 2003 at the Canandagua Inn, Canandagua, NY. Get more information by calling Robin Huizinga at 607/255-4478, or emailing Robin at dmconf@cornell.edu.

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