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# COW/CALF CORNER

**The Newsletter**
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## Realistic Expectations from Estrous Synchronization and AI Programs

by Glenn Selk, OSU Extension Cattle Reproduction Specialist

Producers that are wanting to improve the genetic makeup of their beef herds very often turn to artificial insemination (AI) as a tool to accomplish that goal. Many times, these producers have very high expectations as they begin the first season of artificial breeding. Perhaps they have heard other producers tell of situations where "near-perfect" pregnancy rates resulted from THEIR artificial insemination program. Everyone wants to get every cow or heifer bred as they start the labor and expense of an AI program. However, the rules of biology do not often allow for 100% pregnancy rates in most situations.

First of all it is important to understand several terms.

**Estrous response rate:** the percentage of cows found to be cycling in response to an estrus synchronization protocol. In other words, if we put 100 cows through the working chute and give them estrous synchronization drugs, and only 80 of those cows responded to the estrous synchronization products, then we have an "estrous response rate" of 80 percent. Perhaps some of the cows were not "ready" because they were later calving or they were in poorer body condition. If we are breeding only after they are detected in heat, then only 80 of the original 100 cows would be bred to AI.

**Conception rate:** the percentage of the cows that were actually inseminated that were palpated and found to be pregnant 60 or more days later. In other words, of the 80 cows in the above example, that were found in heat and inseminated, IF we later found that 70 percent of those "settled" or became pregnant, we would have found 56 cows pregnant.

**Pregnancy rate:** the percentage of cows that were initially started on the estrous synchronization protocol that actually became pregnant. In the above example, 56 of the original 100 cows became pregnant to the AI program resulting in a pregnancy rate of 56%.

Therefore, the **Estrous response rate** X **Conception rate** = **Pregnancy rate.**

In this example: **80% Estrous response** X **70% Conception** = **56% Pregnant**. The above example is hypothetical, yet very much close to the expected outcome of a successful synchronization and AI program. If heat detection is incorporated as part of the system, then it becomes another very important part of the equation.

Below is a brief summary of just a few of the many trials conducted to study synchronization methods. As you look at this table, observe that similar results occur within the same study (or ranch). There is more difference expressed between operations than between the synchronization methods chosen. Note that most pregnancy rates vary between 35 and 60%.

Table 1. Pregnancy rates (%) in five different beef and dairy studies using three different methods of synchronization

| Study | 2000 Kansas Study | 1999 Minnesota Study | 1999 Colorado Study | 1999 Kansas Study | 1995 Florid |
|---|---|---|---|---|---|
| Number of cattle | 240 | 471 | 124 | 588 | 346 |
| Method A | | 37% | 58% | 56% | |
| Method B | 58% | 35% | 47% | 46% | 50% |
| Method C | 58% | | | 52% | |

These research trials were conducted under typical farm or ranch conditions with experienced insemination technicians. They give producers a realistic look at what to expect from synchronization and AI programs. Of course some operations will have better results and some will have more disappointing outcomes. We hope everyone has 100 percent pregnancy rates this year, BUT, lets also be realistic.

# Choosing Summer Annual Forage Crops to Reduce Risk of Nitrate Toxicity

By Glenn Selk, OSU Extension Cattle Reproduction Specialist

Annual forage crops like forage sorghums make valuable contributions to the hay supplies in Oklahoma. They are well adapted, very productive and provide high quality forage. However, some of these plants accumulate toxins that can result in costly livestock losses.

Nitrate is the primary nutrient form of nitrogen in most soils and is a normal constituent of plants. Normally nitrate is assimilated into plant protein so rapidly following uptake from soil that its concentration in plant tissues is low. Occasionally, excessive levels occur in plants. The most notorious accumulators of nitrate in Oklahoma are the plants in the sorghum family including johnsongrass. Certain weeds (pigweed, mustard, nightshade and lamb's quarters) also can contain dangerous levels.  Some perennial grasses (bermudagrass, fescue) very rarely have been reported to accumulate high levels of nitrate.

Accumulation is usually triggered by some environmental stress, where plant growth is restricted but absorption of nitrate from soil continues. The most common stress of summer annuals is drought. Lack of moisture, together with excessive soil nitrogen for existing growing conditions, is a frequent cause of toxic levels of nitrate in sorghums.

The level of nitrate that causes toxicity in ruminants varies depending on rate of intake, diet, acclimation to nitrate and nutritional and reproductive status. As a rule, forage containing less than 5,000 ppm nitrate on a dry matter basis is safe for non-breeding cattle. Forage containing 5,000 to 10,000 ppm nitrate is considered a potential source of production loss when provided as the only feed. Production losses are usually manifest as reduced milk production and lowered reproductive performance.  Forage containing over 10,000 ppm nitrate is considered dangerous, and potentially lethal.  These high concentrate forages often can be fed safely after proper dilution with other feeds.

Questions among cattle producers and hay growers about the potential nitrate accumulation in various forages caused the following experiment to be conducted and reported.

During the first summer, 17 varieties of Sorghum x Sudan, 12 varieties of Sorgo x Sudan, five varieties of Sudan x Sudan hybrids, and six varieties of Pearl Millets were being grown at three Oklahoma State University Agronomy Experiment Stations for yield evaluations. The second year of the study was conducted with 18 varieties of Sorghum x Sudan, nine varieties of Sorgo x Sudan, two varieties of Sudan x Sudan hybrids and five Pearl Millets. Field locations were: Eastern Oklahoma Agronomy Experiment Station at Haskell, OK in Muskogee County; South-Central Oklahoma Agronomy Experiment Station in Grady County near Chickasha; and the Southwestern Oklahoma Station near Tipton in Tillman County.  The following table lists the average nitrate concentration of hay samples collected from these plots over the two summers. Obvious differences in locations are apparent, reflecting differences in soil type and soil moisture in those two growing seasons.  Equally apparent is the fact that pearl millet consistently accumulated nitrate at greater concentrations than did the other forage types.

Table 1. Least squares means (averages) for nitrate concentration in ppm for four types at three locations.

| | Location | | |
|---|---|---|---|
| Forage type | Eastern (near Haskell) | South-Central (near Chickasha) | Southwest (near Tipto |
| Sorghum x Sudan | 7795 | 3302 | 7049 |
| Sorgo x Sudan | 7291 | 3255 | 6673 |
| Sudan x Sudan | 8079 | 3461 | 7190 |
| Pearl Millet | 14122 | 6572 | 10534 |

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Millets have been shown in other research to be unlikely to accumulate a different toxin called prussic acid.  Prussic acid will tend to dissipate when the crop is cut for hay and, if allowed to cure thoroughly, will be reduced extensively. Therefore, **if the summer annual, that producers plan to plant this spring, is targeted to be a hay crop, it makes sense to plant one of the other forage sorghums, not the pearl millets**. Planting one of the other forage sorghums does **NOT** eliminate the risk of nitrate toxicity (but does reduce it), AND if grazed after stress such as frost or drought may accumulate prussic acid. Therefore, if the plan for the crop is to graze it in the early fall (when frost and prussic acid is probable) then the millets may still warrant consideration.

**Producers are strongly encouraged to plan the use of the crop before they select and plant the seed.** Learn more about nitrate toxicity in livestock by reading OSU Fact Sheet PSS-2903.