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Refresh your AI technique checklist

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We have all come to understand the power of artificial insemination (AI) in the dairy industry. Milk yield per cow has nearly tripled since the adoption of AI in the late 1930s. While the contributions of improved nutrition, herd management, veterinary care, and related factors cannot be overlooked, it is generally accepted that at least half of this increase in milk production can be attributed to genetic improvement facilitated by AI.

The AI process itself has been progressively modernized over the decades. We have transitioned from the use of fresh semen to frozen semen, and from storage in glass ampules to plastic straws. Despite these technological advances, the fundamental act of inseminating cattle has changed little over time. Successful AI still requires precise passage of the insemination rod through the cervix and deposition of semen into the uterine body within approximately 10-15 minutes of thawing.

Another notable evolution in AI practice is the scale of operations we now deal with when inseminating cattle. Many AI technicians now inseminate tens, and often hundreds, of cows and heifers within a single session. This high-throughput system undoubtedly builds expertise in cervical navigation; however, proficiency in passing the insemination rod is only one component of successful reproductive performance. A continual, conscious emphasis must also be placed on strict adherence to the entire AI process—from semen handling at removal from the liquid nitrogen tank to insemination in order to fully realize the reproductive potential that AI technology can offer.

Here is a checklist of activities that must be completed to optimize pregnancy success with AI:

1) **One thing at a time, all things in succession.**
    - Focusing on the task at hand is essential for optimizing AI success.
    - Set aside your other tasks for today, this week, and this month.
    - Ensure that everything you need is in front of you before you begin.
2) **Cleanliness is a habit, not an act.**
    - A clean workstation is absolutely required.
    - Clean the AI rod, scissors, tweezers, and other metals between each use.
    - Keep hands clean to prevent contamination of the AI sheath, or worse, the semen straw.

- Clean the semen thaw units frequently, at a minimum at the end of each day's work.
- I bet you dollars to donuts that the best AI technicians maintain the cleanest AI rods, scissors, and hands—and that the poorest performers do not.

3) **Slow is smooth and smooth is fast. Be consistent and deliberate in each step of the process.**
   - Do not lift the semen canisters above the thaw line.
   - Thaw semen for at least 45 seconds as a safe standard.
   - Remove all water from the straw before loading.
   - Cut the straw cleanly and squarely and ensure that rod insert fits snuggly over the straw tip.
   - Wrap the tip of the AI rod in a paper towel and keep it close to your body to keep it warm and protect it from light and moisture.
   - Do not rush to the cows. You staying calm will help keep them calm.
4) **Precision is your friend; speed is your enemy.**
   - Your cow-side demeanor should be calm, deliberate, and efficient.
   - Clean the vulva, enter the vagina, and work through the cervix using your palpation hand and not by forcing the AI rod.
   - Prioritize accurate rod tip placement in the uterine body.
   - Dispense the semen slowly and steadily; the process should take more than 5 seconds.
5) **If you made the mess, you own the cleanup.**
   - Cleanliness is so important, it warrants repetition.
   - Clean your AI rod, scissors, tweezers, and hands before beginning the next semen thawing cycle.

Feeding fats in dairy diets: How whole cottonseed impacts milk production

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Why Fat Matters in Dairy Diets

With rising feed costs and pressure to maintain milk components, dairy producers continue looking for practical ways to increase dietary energy without negatively affecting rumen health. Whole cottonseed remains a useful option because it provides fat, fiber, and protein in one ingredient. The objective of this article is to explain how whole cottonseed can affect milk production, milk fat, digestibility, and overall ration management in modern dairy diets. Recent research has shown that whole cottonseed can support milk production and milk fat yield, but the response depends on inclusion rate, cow stage of lactation, and the balance of the entire diet (Bales et al., 2024; Adeniji et al., 2025). Because whole cottonseed contains unsaturated fatty acids, it must be fed carefully to avoid negative effects on fiber digestion, rumen fermentation, and milk components.

How Whole Cottonseed Affects the Rumen

Fats provide more than twice the energy of carbohydrates, making them an effective way to increase dietary energy density in dairy rations. However, unsaturated fatty acids behave differently in the rumen than saturated fats. When unsaturated fats enter the rumen, microbes convert them into more stable forms through a process called biohydrogenation (Pierce et al., 2024). During this process, intermediate compounds can form that negatively affect rumen fermentation and milk fat synthesis. One common issue associated with excess unsaturated fat is milk fat depression, where milk fat percentage declines due to changes in rumen fermentation and fatty acid metabolism (Pierce et al., 2024). High levels of unsaturated fat may also reduce fiber digestion by inhibiting fiber-digesting bacteria. Because whole cottonseed contains a large amount of unsaturated fatty acids, maintaining proper inclusion rates and adequate

effective fiber in the ration is important for maintaining rumen health and milk components.

Whole Cottonseed: A Multi-Purpose Feed Ingredient

Whole cottonseed is commonly used in dairy diets because it provides fat, fiber, and protein in a single ingredient (Adeniji et al., 2025; Bales et al., 2024). This combination allows producers to increase dietary energy without substantially increasing starch levels in the ration. The fat in whole cottonseed is primarily unsaturated, while the fiber helps support rumen function and chewing activity. Recent research has shown positive production responses when whole cottonseed is included at moderate levels in dairy rations (Bales et al., 2024; Adeniji et al., 2025). Bales et al. (2024) reported improved milk production responses when whole cottonseed was included at 8 to 16% of diet dry matter in high-producing dairy cows. Similarly, Adeniji et al. (2025) observed a 0.2 percentage unit increase in milk fat concentration and a 110 g/day increase in milk fat yield when cows were fed 15% whole cottonseed. Whole cottonseed can be particularly useful in high-producing or early-lactation cows that require additional dietary energy. In addition to supplying energy, its physical form may help maintain rumen stability compared with some more rapidly available fat sources. These characteristics continue to make whole cottonseed a practical feed ingredient in many dairy operations.

Benefits and Production Impacts

When included at moderate levels, whole cottonseed can improve energy intake and support milk production, particularly in high-producing and early-lactation dairy cows. Parales-Girón et al. (2026) reported improved milk fat yield and energy intake when cows were fed diets containing 10% whole cottonseed during early lactation. In another study, Bales et al. (2024) observed improved milk production responses when whole cottonseed was included at 8-16% of diet dry matter. Providing additional dietary fat allows producers to increase energy density without substantially increasing starch levels in the ration, which may help reduce the risk of ruminal acidosis. Adeniji et al. (2025) also reported that feeding 15% whole cottonseed increased milk fat concentration by 0.2 percentage units and increased milk fat yield by 110 g/day. However, feeding excessive levels of unsaturated fat may negatively affect rumen fermentation and fiber digestion. Research has shown that high levels of unsaturated fatty acids can contribute to milk fat depression and reduced fiber digestibility when diets are not properly balanced (Pierce et al., 2024). Because milk fat depression is often one of the first visible indicators of imbalance, producers should closely monitor milk fat percentage, dry matter intake, and manure consistency when feeding higher levels of whole cottonseed.

Challenges and Risks

Although whole cottonseed can provide production benefits, it must be managed carefully within the ration. Research has shown that excessive unsaturated fat may negatively affect rumen fermentation and fiber digestibility, particularly when effective fiber levels are inadequate (Pierce et al., 2024). Most recent studies reporting positive responses have used inclusion levels between approximately 8-15% of diet dry matter (Bales et al., 2024; Adeniji et al., 2025). Another important consideration is gossypol, a naturally occurring compound found in cotton plants. While dairy cattle can generally tolerate moderate amounts of gossypol, excessive intake may negatively affect animal health and reproduction. Research evaluating whole cottonseed feeding reported increased plasma gossypol concentrations as inclusion levels increased, although levels remained below toxic thresholds in those studies (Adeniji et al., 2025; Bales et al., 2024). Cottonseed quality and consistency can also influence feeding value. Differences in storage conditions, processing, and seed quality may affect nutrient composition and animal performance. For this reason, regular feed testing and careful ration balancing remain important management practices when incorporating whole cottonseed into dairy diets.

Management Considerations for Producers

Successful use of whole cottonseed requires careful ration balancing and monitoring. Producers should maintain adequate effective fiber in the diet and avoid excessive total dietary fat levels to help support rumen fermentation and milk fat production. Monitoring milk fat percentage, dry matter intake, and manure consistency can help identify potential issues early when feeding higher

levels of whole cottonseed. Research suggests that inclusion rates around 8-15% of diet dry matter may provide production benefits while limiting negative impacts on rumen function (Bales et al., 2024; Adeniji et al., 2025). However, responses can vary depending on stage of lactation, forage quality, and the overall ration. Because cottonseed quality and market price can fluctuate, evaluating the economic value and nutrient composition of each load is also important before incorporating it into dairy diets.

Take-Home Message

Whole cottonseed continues to be a valuable feed ingredient for dairy producers because it supplies energy, fiber, and protein in a single source. Recent research has shown that moderate inclusion levels can improve milk production and milk fat yield, particularly in high-producing dairy cows (Bales et al., 2024; Adeniji et al., 2025). However, successful use depends on maintaining proper ration balance and monitoring rumen health, milk components, and overall cow performance. When managed correctly, whole cottonseed can be an effective tool for improving dairy ration efficiency and supporting productivity.

Upcoming Events

June 8-11, 2026
Virginia FFA Convention (Youth)

June 12, 2026
Virginia Dairy Expo

June 13, 2026
Farming in the city event

June 15, 2026
Application deadline for the following Alliance to Advance Climate Smart Agriculture programs

- Virginia General Program
- Pasture Renovation Subpilot Project

June 22, 2026
Submission Deadline for the June Dairy Month Poster Contest (Youth)

July 6-10, 2026
Southeast Youth Dairy Retreat (Georgia)

July 22, 2026
Southeast Dairy Business Innovation Initiative
Grants Opening:

- Dairy Business Planning Grant
- Specialty Processing Equipment Grant

July 30, 2026
4-H Dairy Judging Contest (Youth)

If you are a person with a disability and require any auxiliary aids, services, or other accommodations for any Extension event, please discuss your accommodation needs with the Extension staff at your local Extension office at least 1 week prior to the event.

Additional Notes:

- The dairy extension group is working with VDH to assist in distributing PPE to dairy farms. Request a kit online at https://shorturl.at/ethov or contact your local extension agent. Requests will be filled as supplies allow.

- Your input could guide future programming! Please complete the short survey at https://tinyurl.com/dairy-extension.

For more information on Dairy Extension or to learn more about our current programs, visit us at VTDairy—Home of the Dairy Extension Program online at www.sas.vt.edu/extension/vtdairy.html

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