Virginia Cooperative Extension
A partnership of Virginia Tech and Virginia State University

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College of Agriculture and Life Sciences

VIRGINIA STATE

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Livestock Update

Beef - Horse - Poultry - Sheep - Swine

December 2010

This LIVESTOCK UPDATE contains timely subject matter on beef cattle, horses, poultry, sheep, swine, and related junior work. Use this material as you see fit for local newspapers, radio programs, newsletters, and for the formulation of recommendations.

IN THIS ISSUE:

Scott P. Greiner, Extension Project Leader
Department of Animal & Poultry Sciences

Dates to Remember

BEEF

DECEMBER

11 Culpeper Sr. VA BCIA Bull Sale. Culpeper. ***Contact***: Scott Greiner, (540) 231-9163, email: sgreiner@vt.edu

JANUARY

11 VT Beef Webinar. ***Contact***: Mark McCann, (540) 231-9153; email: mmccnn@vt.edu

FEBRUARY

10-11 VA Beef Industry Convention. Hotel Roanoke. ***Contact***: Bill McKinnon, (540) 992-1009, email: bmckinnon@vacattlemen.org

MARCH

20 VA BCIA SW Bull Test Open House. Dublin. ***Contact***: Scott Greiner, (540) 231-9163, email: sgreiner@vt.edu

26 VA BCIA SW Bull Test & Bred Heifer Sale. Wytheville. ***Contact***: Scott Greiner, (540) 231-9163, email: sgreiner@vt.edu

SHEEP

DECEMBER

4 VA Sheep Producer's Association Fall Bred Ewe Sale. Rockingham County Fairgrounds. Harrisonburg. 1:00 p.m. ***Contact:*** Corey Childs, (540) 955-4633

JANUARY

15 Shepherd's Symposium. Augusta County Government Center. Verona. ***Contact***: Scott Greiner, (540) 231-9163, email: sgreiner@vt.edu

SWINE

FEBRUARY

27 Youth Swine Day. VA Tech. Blacksburg. ***Contact:*** Dr. Cindy Wood, (540) 231-6937, email: piglady@vt.edu

December Beef Management Calendar

Dr. Scott P. Greiner
Extension Animal Scientist, VA Tech

Spring Calving Herds

- Market backgrounded, value-added calves
- Feed replacement heifers to gain 1.5 – 1.75 lbs per day, adjust nutrition based on target
- Monitor body condition of cows
- Test hay for nutrient content and supplement accordingly
- Increase energy during cold periods
- Attend bull and replacement heifer sales
- Evaluate cull cow marketing plan
- Winterize waterers
- Send in soil samples if not done earlier this year

Fall Calving Herds

- Begin breeding season on cows; complete AI on heifers
- Monitor body condition on cows and especially first calf heifers
- Manage 2 and 3 year-old cows separate from main herd
- Feed cows extra energy after calving; some protein may be needed also if good stockpiled forage is not available. Cows calving at BCS < 5 should receive special nutritional attention.
- Keep high quality, high magnesium, high selenium minerals available
- Monitor breeding activity, condition and health of all bulls; remove and replace injured or thin bulls
- Winterize waterers
- Send in soil samples if not done earlier this year

Dr. Dan Moser Featured Speaker for VT Beef Webinar January 11

Dr. Scott P. Greiner
Extension Animal Scientist, VA Tech

Dr. Dan Moser from Kansas State University will be the featured speaker for the second Beef Webinar sponsored by Virginia Cooperative Extension and scheduled for 6:30 p.m., Tuesday, January 11th. Dr. Moser will provide insight as the role and use of genomics in beef cattle selection through the webinar titled "Utilizing DNA for Genetic Improvement of Beef Cattle: Past, Present, and Future." Dr. Moser has been actively involved in research and industry projects related to this topic, including the NCBA Carcass Merit Project. Dan also teaches genetics and animal breeding courses at Kansas State, and is active in his family's Hereford and Angus seedstock operation.

Check with your Extension Agent about accessing the program at your local office. Producers with high speed internet service can access the meeting at home. Webinar information and meeting links are also available on the VT Beef Extension webpage http://www.vtbeef.apsc.vt.edu/ . From the VT Beef Extension site, you can click on the meeting link and go directly to the meeting. Participants in the on-line meeting will have the opportunity to ask questions through an on-line chat box or over the telephone using a number provided during the program.

A recording of the December Beef Webinar can be accessed through the VT Beef Extension page. In addition to the January meeting, future webinars are scheduled for February and March. If you have questions please contact Mark McCann at 540-231-9153.

2010 – 2011 BCIA Southwest Bull Test Season Begins

Joi Saville
Beef Extension Associate, VA Tech

The 32nd Annual Southwest Virginia Beef Cattle Improvement Association (BCIA) Performance Tests began on October 5, 2010 with the delivery of 175 junior and senior bulls to Hillwinds Farm in Dublin, VA.

Tim, along with his wife, Cathy, and their 4 children, Laura, Allison, Caroline, and Heath, own and operate Hillwinds Farm, in Dublin. Tim has been feeding bulls for 6 years for the BCIA test stations. "I decided to become involved in the process," stated Sutphin, and the rest is history. As a longtime bull buyer, Sutphin decided to become involved in the process of bull evaluation, and became a feeder for the BCIA Southwest Bull Test Station as a result. "My interest in the program coincided with several other things that were happening at the time, and since then, it has been a great relationship," continued Sutphin.

As a third party administrator of the Bull Test Program, BCIA works to serve its two purposes of: 1) to foster the improvement of beef cattle in Virginia through improved genetics and management with major emphasis placed on selection criteria for traits of economic importance, and: 2) to carry on educational and promotional work in connection with the production of improved beef cattle. The Association currently has approximately 175 active members consisting of both purebred and commercial producers from Virginia and surrounding states. The Board of Directors consists of 10 members representing state breed associations and commercial cattlemen. Virginia BCIA is a state organization which belongs to the Beef Improvement Federation -- the national organization which sets guidelines and standards for beef cattle genetics (EPDs, performance reporting, etc.).

With the above mission in mind, BCIA sets forth strict requirements for bulls to be tested in one of their programs. Some of the eligibility requirements include: bulls meeting minimum YW EPD requirements based on breed; minimum frame score of 5.0; soundness; disposition; and pre-weaning and vaccination programs. In addition to the above requirements, BCIA has adopted a new policy in which all bulls are required to be free of genetic abnormalities.

In addition to the minimum requirements for test, bulls are also required to average 2.5 pounds of gain per day of age at delivery, as well as a minimum weaning period of 45 days and started on feed.

The senior and junior bulls will be on test for 112 days. During this testing period, weights will be taken as well as hip height measurements, ultrasound data collection, and semen testing. At the end of the test, the top two-thirds of the bulls on test will be selected for the sale. This selection takes into account the bull's growth, average daily gain, frame score, scrotal circumference, and exceeding minimal EPD requirements.

Out of the 175 bulls that were delivered to the test station, the 71 Senior bulls consist of 42 Angus, 2 Gelbvieh, 2 Gelbvieh Balancers, 5 Polled Hereford, 8 Simmental, and 12 Simmental Hybrids that were born between September 15 – December 31, 2009. The 104 Junior bulls consist of 58 Angus, 4 Charolais, 1 Gelbvieh, 3 Gelbvieh Balancers, 10 Hereford, 11 Simmental and 17 Simmental Hybrid bulls that were born between January 1 – March 31, 2010. Please visit the website, www.bcia.apsc.vt.edu to see how the bulls perform over the course of the test. The bulls are scheduled to come off test on February 8, 2011 with the sale scheduled for Saturday, March 26, 2011 at the former Umberger Sale Facility in Wytheville, VA. The annual Open House will be hosted at the station on Sunday afternoon, March 20.

Watch for updates in the BCIA Bull-e-tin on the Southwest and Culpeper Senior Bull Tests. The sale date for the Culpeper Senior Bull Test is set for Saturday, December 11, 2010.

Video Clips of Culpeper Senior Bulls Available

Joi Saville
Extension Beef Associate, VA Tech

A new feature for this year's 53rd annual sale of the Virginia BCIA Culpeper Senior bulls is available now on the Virginia Beef Cattle Improvement Associations' web site. This year, we have video clips of the bulls available for the 2010 Culpeper Senior Bull Test Sale that will be held Saturday, December 11, 2010 at 12:00 noon at the Culpeper Agricultural Enterprises located on Route 29 just south of Culpeper, Virginia. These clips individually feature each of the bulls available for sale and provide prospective buyers a good opportunity to preview the bulls prior to sale day. Additionally, the video will assist those interested in bidding absentee or via the telo-auction. VA BCIA would like to thank Southern States and Mike Shanahan of Shanahan Cattle Promotions for their support of this new feature.

This year the sale will include 57 fall-born yearling bulls representing the top end of the 84 bulls developed. Currently, 51 Angus, 1 Gelbvieh, 4 Gelbvieh Balancers, and 1 SimmAngus bulls are available for sale on December 11th.

The majority of the bulls selling are sired by trait-leading, highly proven AI bulls of each breed. All bulls selling meet minimum genetic requirements (EPDs) to sire calves for the VQA Purple Tag Feeder Calf Program. Bulls have been screened for reproductive and structural soundness, and offered as guaranteed breeders. Complete performance information will be available on all bulls, including growth, maternal, and carcass EPDs, detailed test performance information, and ultrasound data.

For video clips as well as catalogs and detailed information on the bulls visit the website http://www.bcia.apsc.vt.edu, or phone VA BCIA at 540-231-9163 or Glenmary Farm at 540-672-7396.

Highlights of the 2010 Hokie Harvest Sale

Dr. Dan Eversole
Department of Animal & Poultry Sciences, VA Tech

The 2010 Livestock Merchandising Class at Virginia Tech entertained a standing-room-only crowd of over 500 supporters and friends in the Livestock Judging Pavilion at the 16th Annual Hokie Harvest Sale on Friday, October 29th. As many of you know, the Hokie Harvest Sale has developed a significant reputation for selling high quality horses, swine, and beef cattle. This year's sale grossed $79,250 and featured 53 lots of purebred and commercial beef cattle and eight commercial swine. Since the equine warmblood program moved to the Middleburg Agricultural Research and Extension Center last December, there were no horses offered in the 2010 student-run sale. This was the first year since 1995, which was the inaugural year of the Hokie Harvest Sale, that there were no horses offered at public auction.

There were 157 registered buyers from Missouri, Ohio, Indiana, Tennessee, South Carolina, Pennsylvania, North Carolina, West Virginia, and Virginia, who attended either the silent auction of swine or the beef cattle sale, which was broadcasted live over the internet by Cowbuyer LLC of Mt. Airy, NC. The beef cattle sale featured 35 head of commercial cattle and 34 animals representing three different purebred breeds – Angus, Hereford, and Simmental. In the cow/calf division, Lot 6 sold with a GAR Game On heifer calf and was the top seller at $2,625. This Angus cow is a daughter of the full sister to B/R New Frontier 095 and Lemmon Newsline C804. She ranks in the elite 2% among current dams for $B at $60.36 and records a progeny IMF ratio of 2 @ 105. This highly-valued four-year-old cow sired by Rito 2V1 sold to George Stovall of Stuart, VA.

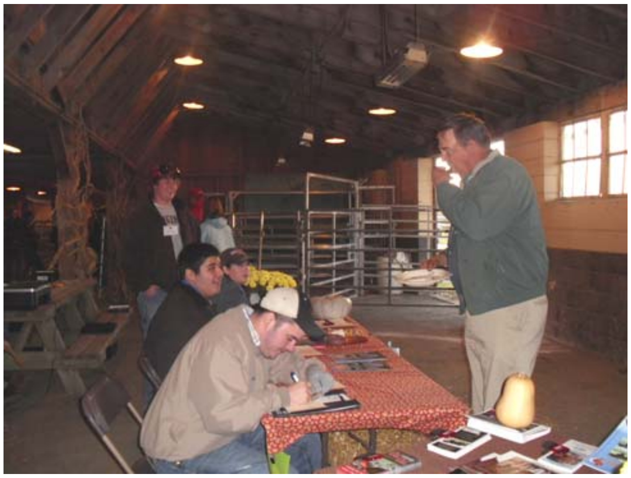
In the Hereford division, Lot 8 commanded the highest bid at $2,650. This first-calf heifer, sired by VPI Limited Edition J921, ranks in the elite 2% of active dams for Marbling and sold to Bob Kube, Fauquier Farm, of Broad Run, VA. Her World Class daughter (Lot 8A) went out-of-state to Robert Mench of Wilkinson, IN.

Flush brothers (Lots 18 and 20) topped the breeding-age bull division at $2,700 each. These Angus yearling bulls are sired by CA Future Direction 5321 and out of the all-time, record-selling female, VT 1407 New Design B4, selected by Clifton Farms, Berryville, VA at $41,000 in 2007. Both bulls ranked in the elite 1% on RE EPD and the upper 2% on $G among non-parent Angus sires. John Saville of Blacksburg, VA and Paul Kiser of Lebanon, VA are the new owners.

John Hedrick of Wayside, WV purchased the top selling Simmental bull (Lot 28) at $2,100. This SimAngus bull is sired by SVF Star Power S802 (Simmental) and out of the foundation Angus donor female, Whitestone Beauty 501R.

The 24 lots of commercial cows, mostly Angus-sired, drew considerable interest among cattlemen and averaged $1,198. Moreover, the three boars and five pregnant gilts grossed $2,000 at this year's sale.

The 76 students did a superb job of preparing for the sale. They gained 'hands-on' experience in sale management, budgeting, cataloging, advertising, livestock photography, clerking, and health requirements. Special thanks are extended to Col. Ken Brubaker of Brubaker Sales and Marketing, Harrisonburg, VA for serving as the sale consultant and beef auctioneer. Students Crystal Founds, Floyd, VA; Christopher Harrison, Madison, VA; Richard Preisser, Madison, VA; and Robert Strickler, Madison, VA served as bid-takers for the beef cattle sale while Trevor Whiteside, Queenstown, MD and Daniel Reynolds, Smyra, DE worked the ring. Jennifer Norman, Warrenton, VA served as the clerk ‘in the block’.



The Food and Beverage Committee, with assistance from the Block and Bridle Club in the Department of Animal and Poultry Sciences, served a complimentary BBQ dinner to over 500 guests. Their support and cooperation are greatly appreciated.

Interest in the Hokie Harvest Sale continues to be overwhelming in favor of hosting future student-run livestock sales. However, purebred animal inventory numbers have dwindled in recent years which make it difficult to continually offer quality livestock at public auction. We are hopeful to host the 17th Annual Hokie Harvest Sale on October 28, 2011.

Ewe Management Tips: Mid and Late Gestation

Dr. Scott P. Greiner
Extension Animal Scientist, VA Tech

Proper management and nutrition of the ewe flock during mid and early lactation are critical for optimizing flock productivity and profitability. Balanced nutrition, coupled with proper management during gestation is important for fetal development, lamb vigor and survival at birth. Additionally, proper nutrition during gestation is important to prevent nutritional disorders which may impact the health and performance of the ewe and her lambs, and influences milk production of the ewe.

There are several factors that affect the nutritional needs of the ewe during gestation, with primary considerations for: 1) age, 2) weight, 3) body condition, 4) stage of gestation (early-mid vs. late), and 5) fetal number (single, twins, triplets). Nutrients of primary interest include energy (TDN), crude protein (CP), calcium, and selenium.

Following breeding, there is a relatively small increase in ewe nutrient requirements during the first 15 weeks of gestation. Requirements for a 175 pound ewe during early and mid-gestation are 55% TDN and 9.4% crude protein on a dry matter basis (at an intake of 3.3 pounds dry matter per day). Often, ewes are grazing during early gestation, and in most cases forage alone will meet or exceed their nutritional needs, and in many cases ewes will gain weight during this period while grazing fall pastures. For winter-lambing flocks, ewes will make the transition from pasture to a diet of harvested feedstuffs during mid gestation. When feeding hay becomes necessary, it is important that the quality and quantity of hay being fed be closely considered. To properly balance rations and control costs, an accurate forage analysis should be conducted on all hays (cost of $10-15). There can be significant variation in hay harvested from different fields at the same time, from one cutting to another, and from year to year out of the same field. Average quality grass or grass-legume hays typically will meet the ewe's requirements during mid gestation, and if ewes are allowed to consume all the hay they will eat many hays will supply considerably more nutrition than required. This emphasizes the importance of saving high quality hays for feeding during lactation, when ewe nutrient requirements are much higher compared to gestation. If high quality hays, such as alfalfa, are fed during mid gestation it is important to limit intakes. Overfeeding during this period is costly and may also result in over-conditioned ewes leading to complications later in the production cycle (ketosis, lambing problems).

Approximately two-thirds of the birth weight of a developing fetus is gained during the last six weeks of gestation. As a result, the nutritional requirement of the ewe for both energy and protein increases during this time. For a 175 pound mature ewe, TDN requirements increase to 57-66%, compared to 55% during early gestation. Similarly, crude protein requirement increases to around 11%. The most critical difference is the increase in energy requirement, particularly during the two weeks prior to lambing. Inadequate nutrition during late gestation may result in pregnancy ketosis, light birth weights, weak lambs, and lower milk production. Energy and protein requirements are also influenced by expected lambing rate with increased requirements for ewe carrying multiple births. In larger flocks, ultrasound diagnosis of fetal numbers can be an excellent management tool by creating an opportunity to feed ewes carrying singles vs. twins vs. triplets separately. Total energy intake requirements in late gestation increase 16% for twin and 31% for triplet-carrying ewes compared to ewes carrying singles. Similarly, total crude protein requirements increase 23% and 45% for twin and triplet carrying ewes, respectively, compared to singles. These increased requirements can be supplied by providing additional hay and grain for multiple birth ewes, and/or providing a more nutrient dense diet. Grain supplementation should begin earlier for multiple birth ewes (3-6 weeks pre-lambing) than ewes carrying singles (2 weeks pre-lambing). Many shepherds utilize the rule of thumb that ewes should receive one pound of grain supplement for each lamb they are carrying.

Selenium and Vitamin E are critical nutrients during gestation. Selenium is passed from the placenta to the fetus during late gestation, and proper selenium supplementation to ewes will assist in preventing white muscle disease in lambs. Selenium is often provided in complete mineral mixes offered free-choice (provide mineral specifically formulated for sheep). For flocks with a history of selenium deficiency, selenium should be added to the grain mix fed to ewes to insure intake. FDA regulates that selenium concentration in free-choice mineral mixes not exceed 90 PPM, and limits total ration concentration of selenium to 0.3 PPM (intake of 0.7 mg/hd/day). While selenium is a very important trace mineral that is required in small quantities, care should be exercised in formulation as higher intakes can be toxic.

Late gestation ewes with inadequate calcium intakes are prone to milk fever. The calcium content of grains is low, whereas forages are generally higher in calcium. Calcium intake should be monitored closely, particularly when feeding corn and corn by-product diets. Supplemental calcium may be provided through a complete grain mix.

Ewes should be vaccinated for clostridium perfringes types C & D and tetanus three weeks prior to lambing. Vaccination of ewes will provide protection to their lambs at birth. Deworming of ewes pre-lambing is also an important management tool to control parasites.

Finally, inventory lambing supplies and prepare facilities well in advance of the lambing season. Early preparation for the lambing season will result in more live lambs saved and enhance potential profitability of the sheep enterprise.

Shepherd's Symposium scheduled for January 15, 2011

Dr. Scott P. Greiner
Extension Animal Scientist, VA Tech

The annual Virginia-North Carolina Shepherd's Symposium will be held Saturday, January 15, 2011 at the Augusta County Government Center in Verona, Virginia. The one-day program will include educational sessions with a variety of production, management, and marketing topics. A lamb lunch will be included. On Friday evening, January 14, open meetings of the Virginia Sheep Producers Association and the Virginia Sheep Industry Council will be hosted. For more information, contact Scott Greiner at 540-231-9163 or sgreiner@vt.edu.

Evaluation of three commercial mycotoxin inhibitors added to *deoxynivalenol*-contaminated corn diets for weanling pigs

Mark J. Estienne, Tidewater AREC

This is the final report for a multi-state project that was coordinated by Dr. Don Mahan of the Ohio State University and included scientists from Kansas State University, Michigan State University, Ohio Agricultural Research and Development Center (OARDC), Western Branch, Purdue University, South Dakota State University, the University of Arkansas, the University of Kentucky, the University of Illinois, the University of Minnesota, the University of Missouri, and Virginia Tech. Appreciation is expressed to OARDC Feed Mill Manager Jack Bardall and his crew for procuring the corns, mixing, bagging, wrapping, and transporting the complete diets to the designated stations.

Summary

A regional study involving 12 experiment stations using a total of 904 weanling pigs in 27 replicates evaluated three commercial mycotoxin inhibitors added to two different ***deoxynivalenol*** (DON; synonym = vomitoxin) contaminated corn sources. The first corn analyzed 2.0 ppm DON while the second analyzed 7.0 ppm DON. The complete diet, mixed and provided in meal form from one mixing facility, was calculated to contain 1.0 and 3.9 ppm DON, respectively. The companies that produced these mycotoxin inhibitors were asked to recommend their level of product (Defusion®, Integral®, Biofix®) to be added to the diets. The study was blinded from participating companies and investigators to prevent bias. The test period was conducted after a 10 day adjustment period to a common diet. The test period that evaluated these mycotoxin inhibitors was conducted from 10 to 31 day post weaning. The results showed that the high DON corn diet reduced performance responses more severely than diets with low DON contamination. Defusion, added at 10 lb per ton was the most effective mycotoxin inhibitor in our study in both corn sources while the other mycotoxin inhibitors were ineffective. Lighter weight pigs were more severely affected by the DON contaminated diets than pigs of a heavier body weight, but both weight groups responded positively to Defusion. It is questionable if the feeding of a low DON contaminated corn would justify the added expense of the product while it was beneficial when DON was at a high level.

Introduction

At the regional swine nutrition meeting in January 2010, the North Central Coordinating Committee on Swine Nutrition (NCCC-042) recognized the extensive vomitoxin (DON) contamination present in much of the 2009 corn crop in the United States. The contamination was also found to be high in corn by-products such as dried distillers grains with solubles. The problem was presented to other regional committees (S-1044 and NCERA-89) who had similar concerns. A combination of investigators from these three groups evaluated how our committees could help the swine producer overcome the DON problem and how to best continue feeding this year’s corn crop, particularly since there were no proven mycotoxin inhibitors on the market. It was reported that many pigs completely refused to eat diets containing these DON contaminated corn sources which ultimately could have serious implications on animal health, welfare issues, and economic returns for the swine producer.

Fortunately most of the DON contaminated corn in the U.S was not at a level that seemed to affect cattle or poultry while swine appeared to be the most sensitive to the mycotoxin. Unfortunately, there were no FDA approved mycotoxin inhibitor products available, but there were some products on the market that were reported to be of benefit. However, they were not studied or reported in the literature within the public domain. It was decided to conduct a joint regional project to evaluate three of the major products available, and to share the results with the farm and feed community as quickly as possible. The goal was to evaluate the mycotoxin inhibitor products as to their effectiveness, and how we would recommend feeding the remainder of this year's corn crop. Our desire was to not only complete the study rapidly but also to report the results widely in lay publications for potential use by the swine and feed industry. There were 12 stations that could conduct the study in a timely manner and they and the principal investigators are identified in Table 1.

Procedures followed

Corn from three sources was purchased with different DON levels for conducting the project. The first source was the cleanest source of corn (DON = 1.9 ppm) available. This corn source was fed during the pretrial period for an approximate 10 day period in order to allow the weanling pigs to get started on a common diet (without any mycotoxin inhibitor added) and to overcome the normal post weaning lag in growth and feed intake. The other two corn sources used in the subsequent test diets analyzed 2.0 ppm or 7.0 ppm DON, the former source analyzing somewhat lower than expected. A complete profile of other major mycotoxins analyzed in these corn sources by HPLC determined that DON was the major mycotoxin present (Table 2), that the other mycotoxins, particularly T-2 Toxin and zearalenone were present but at levels below that which would cause problems.

The pretest diet was fed for approximately 10 days and was comprised of dietary feedstuffs normally fed in a phase 1 diet to weanling pigs. Test diets during the following 21 day test period were formulated to utilize as much corn in the diets as possible in order to best test the efficacy of the three selected mycotoxin inhibitor products. Only one diet was fed from the 10 to 31 day period for each treatment group. The companies were contacted and they all agreed to have their products evaluated.

All cooperating stations fed the same pretest diet, used the same corn sources, and used the sane diet mixtures (including the pretest diet), mixed at one location (OARDC feed mill, Wooster, OH) and transported to each cooperating station in early February 2010. All diets were formulated to meet or exceed current NRC (1998) swine nutrient requirements (Table 2). Although the products were mixed in some cases a few weeks prior to being fed, most of the studies were done shortly after the diets arrived at the various stations (see Table 1 for staring dates). The three products to be incorporated into the test diets (Defusion®. Integral®, and Biofix Plus®, was added at the expense of corn starch to maintain the same nutrient profile of the remaining dietary constituents. The three commercial mycotoxin inhibitor products were purchased on the open market to ensure that the companies would not be accused of preparing special products for this trial. Each contributing company was given the opportunity to evaluate the corn mycotoxin assay results, the diet formulas that the products were to be added, and to recommend the incorporation level of their product into the test diets with the two corn sources. The amount of products added to the 1.0 ppm diets were (Defusion 10 lb/ton; Integral 4 lb /ton and Biofix Plus 8 lb/ ton), while the amount suggested for the 3.9 ppm diets were (Defusion 10 lb/ton; Integral 6 lb/ton; and Biofix Plus 8 lb/ton). In addition, the treatment and product identification was blinded not only to the company but also to the investigators. Each investigator was asked to collect performance data but to also evaluate other signs, denoting the date and reasons why pigs might be removed from the study. At the completion of the study, each company and investigator was again given the opportunity to review the final results without knowing which treatment represented specific products. All of this was done to ensure that bias would not enter into the conduct of the trial or data interpretation.

The three products evaluated were from the following organizations: BioMin (Biofix Plus®), Akey (Defusion®), and Alltech (Integral®). Vomitoxin consumption has been reported to result in reduced feed intakes, reduce body weight gains, and sub-clinical immune suppression. High levels of vomitoxin may produce intestinal lesions, vomiting, and complete feed refusal. Pig gain and feed intake performance criteria were the measurement traits evaluated in this study. A short explanation of the products and how each product might function in reducing the effects of DON follows:

Biofix **Plus** (Bio Min) contains yeast cell wall, natural microbials, and diatomaceous earth (clay) which may be effective in reducing DON and other mycotoxins.

Defusion (Akey) is a blend of preservatives, antioxidants, amino acids, and direct-fed microbials which is thought to decrease some of the toxic effects of vomitoxin in pigs.

Integral (Alltech) is a yeast cell wall that has been modified and may serve as an adsorbent of dietary mycotoxins.

The completed trial data was statistically analyzed using conventional SAS analysis of variance procedures. Although pigs were allotted on initial body weight at weaning they were fed a common diet for an approximate 10 day period. Consequently, the weights at the beginning of the test period differed slightly. Thus the 10 day weights were adjusted by covariate analysis (to use a common initial weight within replicate from 10 to 31 day) to ensure that the responses were not affected by differences in weight at the beginning of the test period.

Results

The complete set of data from all stations involving all replicates is reported in Table 3. There were 12 stations that conducted the trial involving a total of 904 pigs. Some replicates contained pigs of an initially lighter or heavier weight at weaning. Therefore six of the lighter weaning weight and seven replicates of the heaviest weight were analyzed independently to see if there were different initial weight responses to the DON contaminated corn sources and the various mycotoxin inhibitors. The performance responses from the 27 replicates are reported in Table 3 while the effect of light or heavy weaning weight pigs are presented in Tables 4 and 5, respectively.

The pretest diet fed for an approximate 10 day period resulted in good performance responses, but two pigs were removed before the product evaluation test period started. Their removal was due to unthriftiness and loss of body weight. In general, the pretest diet that contained a low innate level of DON (0.80 ppm) did not appear to affect pig gains or feed intakes (Table 3).

Feeding the treatment test diets (days 10 to 31 post weaning) clearly resulted in different performance responses to the two different corn sources. Pigs consuming the 7.0 ppm DON corn (diet calculated at 3.9 ppm DON) had reduced pig body weight gains and feed intakes each week of the test period compared to the corn that tested 2.0 ppm DON (diet calculated 1.0 ppm DON). Unfortunately we did not have access to corn without DON contamination and could not make a comparison to such corn. There was no incidence of feed refusal for either of the two test corn sources, but feed intake was reduced when the higher DON contaminated corn was fed. There were a total of five pigs removed from the study. Although unthriftiness of pigs was generally recognized throughout the study it was not severe enough to remove pigs from the trial. Of those pigs removed, the prevailing observation was a decline in body weight, limb immobility, and pneumonia. There was evidence of swollen vulvas when pigs consumed the 3.9 ppm DON diet but this was probably reflective of zearalenone contamination not DON. There was no reported incidence or evidence of intestinal hemorrhages which would be indicative of T-2 Toxin. As expected, the major negative response from DON contamination appeared to result in reduced gain, reduced feed intake, and a general unthriftiness, the latter response was most likely because of the low feed intake.

Comparison of the three commercial mycotoxin inhibitor products for all stations for the 27 replicates is reported in Table 3. For the low Don contaminated corn only Defusion proved to be effective by increasing pig gains and feed intakes during week 1 and 3 of the test period over that of the negative control diet. The effect of the other mycotoxin inhibitors to the diets was statistically similar to the negative control. The overall growth rate and feed intake did not, however, differ significantly for most of the trial for two of the three mycotoxin inhibitors products, but there was an apparent numerical advantage to Defusion. Although this level of DON is reported to be tolerated by the young pig, our results would indicate that its additional expense to diet cost may not be cost effective when a low level (≤ 1 ppm) of DON is fed to weanling pigs.

In contrast, when the high DON corn diets (calculated at 3.9 ppm DON) were fed those pigs consuming the diet with Defusion weighed more at the end of the trial, gained more weight and consumed more feed during each week of the trial than those fed the control or Integral or Biofix Plus mycotoxin inhibitors.

When pigs were evaluated by weaning weight groups they responded to the two corn sources and mycotoxin inhibitor products somewhat differently. The results of the lighter weight pig group (Table 4) indicated that their response to the DON contaminated corn source was more pronounced than the heavier pig group (Table 5). In the light weight group there was a clear benefit to Defusion for both DON contaminated corn sources, whereas there was no response to the other two products. The benefits of Defusion were evident during the initial week of the test period and continued throughout the remainder of the trial. In the heavier pig group the same general trends occurred but the results were not as dramatic as when the lower DON contaminated corn source was fed. Again with the higher DON contaminated corn, Defusion still proved to be the superior mycotoxin inhibitor in both growth rate and feed intake during each week of the trial.

Discussion

Although Defusion was superior in our trial, the corn used in these treatment diets was primarily contaminated with DON and not the other Fusarium molds. How the other mycotoxin inhibitor products used in our study would respond with corn that also contained zearalenone, T-2 Toxin or aflatoxin is unknown. It is unusual that corn mycotoxins are predominated by a single mycotoxin and in some cases the other products might be effective against the other mycotoxins.

Because Defusion was also added at a high level, it is not known what a lower dietary inclusion level would produce.

There are several lessons and recommendations that we can make from this study.

1. It is important to analyze for the various mycotoxins present in corn sources or their by-products when fed to swine. The "quick test" done by most elevators is a good starting point for determining the amount of contamination but these tests are not completely reliable and highly variable. Once a large quantity of corn is stored it is a good idea to test the entire bin (several probes) and be analyzed by a recognized laboratory using modern techniques. Be sure to test at various sites in the bin so as not to isolate a "hot spot". Mycotoxin contaminated grains seem to accumulate along the outer edge and in the center of the storage facility.
2. The mycotoxin inhibitors to be used should have public research conducted or research publically presented to ensure that the claims presented are valid and unbiased. The companies being evaluated in this experiment are using this and other research findings that they are conducting to produce better products or to know how to best use their product. These companies are already in the development stage of evaluating newer products.
3. It is possible that the value of mycotoxin inhibitors may vary with different feeding or management conditions. For example we used a dry meal fed diet with weanling pigs. If a swine producer is feeding their feed with water, the enzymes in these or other products might be activated and be more effective than if fed in the dry meal form. The company would be able to address these issues with the swine producer.
4. With the current 2009 corn crop, the grain should be cleaned and fines removed prior to grinding and mixing into swine diets, as most of the mycotoxin will be located in this portion of the grain.
5. Wheat and other grains can also be contaminated during the flowering and early milk or "boot" stage. Consequently, the straw from such crops may be contaminated. There is current evidence that at least some of the current 2010 wheat crop may be contaminated with DON.
6. Stored corn should be dried to a minimum of 14% moisture and aerated frequently so that the mycotoxins will not continue to develop in the bins. When removing grain from the bin, try and remove corn in large batches so as not to isolate "hot spots".
7. Weanling pigs and reproducing animals should be fed better corns as they are more sensitive to mycotoxins and these production phases will more readily influence pig profitability. Older pigs, particularly grower finisher pigs appear to be able to tolerate higher levels of DON.
8. The use of other grains or ingredients free from mycotoxin contamination should be considered in current diet formulas. But they should be screened for mycotoxins.
9. It is important that when current storage facilities are emptied that they be thoroughly cleaned and a fungicide applied before new corn is added.

Table 1. Project participants and appropriate pig experimental details

Institution	Project leader	Date Started	Weaning age, days	Weaning wt., lb.	Pen spaces ft^2/pig	No. Pigs	Pigs per pen	Feeder holes per pen
Kansas State University	J. Nelssen	3/11/10	21	14.3	3.8	80	5	3
Michigan State	G. Hill	4/23/10	22	17.8	4.8	80	5	3
OARDC, Western Branch	S. Moeller	2/5/10	25	18.1	3.2	80	5	8
Ohio State University	D. Mahan	2/18/10	17	13.7	4.0	80	5	4
Purdue University	L. Adeola	2/22/10	18-23	13.5	9.6	80	5	1
South Dakota State University	C. Hostetler	2/25/10	21	14.5	7.1	48	3	3
University of Arkansas	C. Maxwell	2/16/10	19	14.6	3.9	80	5	2
University of Kentucky	M. Lindemann	4/29/10	17-21	14.5	4.0	64	4	4
University of Illinois	H. Stein	2/24/10	19	11.9	4.0	64	4	5
University of Minnesota	S. Baidoo	2/16/10	18	13.8	6.6	96	3	3
University of Missouri	M. Carlson	4/3/10	21	14.8	4.0	72	3	4
Virginia Tech	M. Estienne	2/18/10	21	17.5	4.8	80	5	4

Table 2. Composition of basal diet (%, as fed basis)

Ingredient	Days of feeding 0 – 10 day[a]	Days of feeding 10 – 31 day[b,c]
Corn	41.70	55.85
Soybean meal, 48%	14.25	26.00
Soy Protein Concentrate	3.00	7.00
Dried Whey	15.00	0.00
Plasma Protein	6.00	0.00
Blood meal, pork	0.00	1.00
Fishmeal	6.00	0.00
Lysine	0.20	0.20
DL Methionine	0.20	0.20
Corn starch	0.00	1.00
Lactose	10.00	4.00
Fat, choice white grease	1.00	1.00
Dicalcium Phosphate	0.90	1.40
Limestone	0.55	1.00
Trace mineral premix	0.20	0.20
Salt	0.25	0.40
Zinc oxide, 72% Zn	0.25	0.25
Vitamin premix	0.25	0.25
Mecadox	0.25	0.25
Mycotoxin inhibitor[1]	0.00	±

[1]Mycotoxin inhibitor product added at the expense of corn starch. The products were added only in the treatment test diets fed from 10 to 31 days post weaning.

[a]Corn analyzed 1.9 ppm vomitoxin; < 0.50 ppm T-2 toxin; <0.50 ppm zearalenone (analysis by HPLC).

[b]Corn analyzed 2.0 ppm vomitoxin ;< 0.50 ppm T-2 toxin; < 0.50 ppm zearalenone (analysis by HPLC).

[c]Corn analyzed 7.0 ppm vomitoxin; < 0.50 ppm T-2 toxin, < 0.50 ppm zearalenone (analysis by HPLC).

Table 3. Effect of mycotoxin inhibitors added to vomitoxin (DON) contaminated corn and fed to weanling pigs

Item	Corn	Test Corn (2.0 ppm DON)				Test Corn (7.0 DON)				
	Product:	None	Defusion	Integral	Biofix	None	Defusion	Integral	Biofix	SEM
	Added/ton; lb.:	0	10	4	8	0	10	6	8	
	Cost/Ton, $:	0	10.00	11.60	22.32	0	10.00	17.40	22.32	
No. of replicates		27	27	27	27	27	27	27	26	-
No. of pigs		113	113	113	113	113	113	113	113	-
No. pigs removed (10-31 day)		1	2	0	0	2	0	0	0	-
Pig weight, lb.										
Weaning		14.7	14.7	14.8	14.7	14.9	14.8	14.8	15.1	0.1
Start of test, 10 d		18.6	18.7	18.8	18.5	18.6	18.8	18.4	19.4	0.2
Final weight, 31 d		39.8^{a}	41.7^{b}	39.4^{a}	39.7^{a}	34.8^{c}	39.7^{d}	34.1^{c}	33.8^{c}	0.4
Pre test period (0 – 10 d)[1]										
Dietary DON level, ppm		0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	-
ADG, lb.		0.35	0.40	0.39	0.39	0.38	0.39	0.38	0.39	0.02
ADFI, lb.		0.48	0.50	0.49	0.49	0.49	0.51	0.48	0.51	0.01
Test period (10-31 d)										
Dietary DON level, ppm		1.0	1.0	1.0	1.0	3.9	3.9	3.9	3.9	-
ADG, lb.										
10 – 17 day		0.71^{a}	0.86^{b}	0.73^{a}	0.74^{a}	0.39^{c}	0.73^{d}	0.42^{c}	0.39^{c}	0.02
17 – 24 day		1.04	1.08	0.97	0.99	0.83^{c}	1.03^{d}	0.77^{c}	0.76^{c}	0.03
24 – 31 day		1.31^{a}	1.42^{b}	1.35^{a}	1.36^{a}	1.11^{c}	1.33^{d}	1.07^{c}	1.06^{c}	0.04
10 – 31 day		1.02	1.09	0.99	1.03	0.75^{c}	1.01^{d}	0.80^{c}	0.74^{c}	0.11
ADFI										
10 – 17 day		0.99^{a}	1.13^{b}	1.01^{a}	1.07^{a,b}	0.71^{c}	0.99^{d}	0.69^{c}	0.70^{c}	0.03
17 – 24 day		1.52	1.57	1.41	1.45	1.15^{c}	1.45^{d}	1.08^{c}	1.04^{c}	0.04
24 – 31 day		1.95^{a}	2.13^{b}	1.94^{a}	1.99^{a}	1.64^{c}	1.98^{d}	1.56^{c}	1.61^{c}	0.05
10 – 31 day		1.50^{a}	1.60^{b}	1.46^{a}	1.52^{a}	1.19^{c}	1.49^{d}	1.16^{c}	1.16^{c}	0.03
Feed/Gain 10 – 31 d		1.48	1.46	1.46	1.49	1.60^{c}	1.46^{d}	1.54^{c}	1.64^{c}	0.05

$^{a, b}$ Means with different superscripts on the 1.0 ppm diet differed ($P < 0.05$).

$^{c, d}$ Means with different superscripts on the 3.9 ppm diet differed ($P < 0.05$).

[1] The pretest period involved feeding a common diet without the mycotoxin inhibitor products added. A total of 2 pigs were removed during the pre test period because of unthriftiness.

Table 4. Effect of mycotoxin inhibitor products added to vomitoxin (DON) contaminated corn fed to light weight weanling pigs

Item	Corn	Test Corn (2.0 ppm DON)				Test Corn (7.0 ppm DON)				
	Product:	None	Defusion	Integral	Biofix	None	Defusion	integral	Biofix	SEM
	Added/ton; lb.:	0	10	4	8	0	10	6	8	
No. of replicates		6	6	6	6	6	6	6	6	-
No. of pigs		29	29	29	29	29	29	29	29	-
Weaning weight, lb		12.4	12.5	12.5	12.3	12.5	12.4	12.5	12.4	
Test period (10 – 31 d)										
Dietary DON level, ppm		1.0	1.0	1.0	1.0	3.9	3.9	3.9	3.9	-
Pig weight, 10 d		15.6	15.5	15.8	15.2	15.4	15.5	15.8	15.3	0.3
Final weight, 31 d		34.3[a]	37.0[b]	34.5[a]	33.6[a]	28.3[c]	33.3[d]	28.2[c]	27.6[c]	0.9
ADG, lb.										
10 – 17 day		0.60[a]	0.78[b]	0.60[a]	0.66[a]	0.32[c]	0.60[d]	0.31[c]	0.29[c]	0.03
17 – 24 day		0.87[a]	1.06[b]	0.87[a]	0.89[a]	0.62[c]	0.88[d]	0.65[c]	0.60[c]	0.05
24 – 31 day		1.23	1.31	1.18	1.13	0.94[c]	1.12[d]	0.95[c]	0.88[c]	0.04
10 – 31 day		0.88	1.00	0.87	0.89	0.60[c]	0.87[d]	0.62[c]	0.60[c]	0.04
ADFI, lb.										
10 – 17 day		0.79[a]	0.99[b]	0.82[a]	0.90[a]	0.67[c]	0.80[d]	0.60[c]	0.55[c]	0.05
17 – 24 day		1.31	1.40	1.19	1.27	0.86[c]	1.28[d]	0.88[c]	0.93[c]	0.05
24 – 31 day		1.74	1.76	1.73	1.69	1.35[c]	1.69[d]	1.41[c]	1.55[c]	0.05
10 – 31 day		1.39	1.44	1.33	1.41	1.04[c]	1.39[d]	1.08[c]	1.16[c]	0.06
Feed/gain ratio										
10 – 31 day		1.59	1.44	1.56	1.62	1.77[c]	1.58[d]	1.81[c]	2.08[e]	0.08

[a, b] Means within the 4.0 DON corn treatment groups differed (P < 0.05).
[c, d,e] Means within the 7.0 DON corn treatment groups differed (P < 0.05).

Table 5. Effect of mycotoxin inhibitors added to vomitoxin (DON) contaminated corn and fed to heavy weight weanling pigs

Item	Corn	Test Corn (2.0 ppm DON)				Test Corn (7.0 ppm DON)				
	Product:	None	Defusion	Integral	Biofix	None	Defusion	Integral	Biofix	SEM
	Added/ton; lb.:	0	10	4	8	0	10	6	8	
No. of replicates		7	7	7	7	7	7	7	7	-
No. of pigs		33	33	33	33	33	33	33	33	-
Weaning weight, lb		17.2	17.2	17.2	17.3	17.2	17.5	17.4	17.1	
Test period (10 – 31 day)										
Dietary DON level, ppm		1.0	1.0	1.0	1.0	3.9	3.9	3.9	3.9	-
Pig weight, lb. 10 d		21.3	21.6	21.6	21.2	21.5	22.0	21.5	21.5	0.5
Final weight, lb. 31 d		45.1	46.2	44.5	44.5	39.5^{c}	44.5^{d}	39.9^{c}	39.3^{c}	1.40
ADG, lb.										
10 – 17 day		0.85	0.91	0.80	0.80	0.44^{c}	0.78^{d}	0.60^{c}	0.44^{c}	0.05
17 – 24 day		1.12	1.05	1.07	1.01	0.90^{c}	1.13^{d}	0.86^{c}	0.93^{c}	0.07
24 – 31 day		1.41	1.53	1.41	1.52	1.23	1.30	1.18	1.18	0.08
10 – 31 day		1.08	1.11	1.04	1.07	0.83^{c}	1.03^{d}	0.86^{c}	0.82^{c}	0.05
ADFI, lb.										
10 – 17 day		1.13	1.18	1.16	1.15	0.75^{c}	1.02^{d}	0.82^{c}	0.80^{c}	0.05
17 – 24 day		1.62	1.67	1.60	1.62	1.17^{c}	1.61^{d}	1.30^{c}	1.26^{c}	0.08
24 – 31 day		2.20	2.30	2.08	2.26	1.94	2.01	1.83	1.74	0.11
10 – 31 day		1.61	1.63	1.55	1.61	1.29^{c}	1.51^{d}	1.34^{c}	1.22^{c}	0.08
Feed/gain ratio										
10 – 31 day		1.46	1.48	1.50	1.49	1.53	1.48	1.47	1.50	0.03

[c, d] Means within the 7.0 DON corn treatment groups differed ($P < 0.05$).