Shawano Ag Newsletter

University of Wisconsin Cooperative Extension

June/July 2018

Shawano County UWEX
311 North Main Street
Shawano, WI 54166
(715) 526-6136

Website:
http://shawano.uwex.edu

Like us on Facebook at:
uwex.shawano.ag

Hours:
Monday - Friday
8:00 am - 4:30 pm

Don't forget!!

35th Annual Shawano County Brunch on the Farm

June 24th

Meal - 9 am to 1 pm
Dairy Dash 5k - 7:30 am

Wagner Farms, Inc.
N6928 County Road BB
Oconto Falls, Wisconsin

Directions:
Shawano: Take Highway 22 North through Cecil, in Pulcifer take County Rd C to the east for 1.5 miles, continue straight on Church Rd for 1.5 miles, turn north on BB and follow the signs for parking

Highway 32: Take County Road E west, turn north on County Rd BB, continue for three miles and follow the signs for parking

An AA/EEO employer, University of Wisconsin-Extension provides equal opportunities in employment and programming, including Title VI, Title IX and ADA requirements

How to Document Blizzard Losses for FSA

Producers who suffered excessive livestock death losses and grazing or feed losses due to our April blizzard may be eligible for disaster assistance programs through the USDA Farm Service Agency (FSA). The Livestock Indemnity Program (LIP) offers payments to eligible producers for livestock death losses in excess of normal mortality due to adverse weather and the Emergency Assistance for Livestock, Honeybees, and Farm-Raised Fish Program (ELAP) provides emergency relief for losses due to feed or water shortages, disease, adverse weather, or other conditions, which are not adequately addressed by other disaster programs. To participate in LIP, producers will be required to provide verifiable documentation of death losses resulting from an eligible adverse weather event and must submit a notice of loss to their local FSA office within 30 calendar days of when the loss of livestock is apparent. To participate in ELAP, producers must submit a notice of loss to their local FSA office within 30 calendar days of when the loss is apparent and should maintain documentation and receipts. Producers should record all pertinent information regarding livestock losses, including: - Documentation of the number, kind, type, and weight range of livestock that have died, supplemented if possible by photographs or video records of ownership and losses; - Rendering truck receipts by kind, type and weight - important to document prior to disposal; - Beginning inventory supported by birth recordings or purchase receipts; - Documentation from Animal Plant Health Inspection Service, Department of Natural Resources, or other sources to substantiate eligible death losses due to an eligible loss condition; - Documentation that livestock were removed from grazing pastures due to an eligible adverse weather or loss condition; - Costs of transporting livestock feed to eligible livestock, i.e. receipts for equipment rental fees for hay lifts and snow removal; - Feed purchase receipts if feed supplies or grazing pastures are destroyed.

For more information , visit www.fsa.usda.gov/disaster or contact the Shawano-Menominee County FSA office at (715) 524-4814 .

May 14, 2018 Hay Market Report

https://fyi.uwex.edu/forage/h-m-r/

Upper Midwest Hay Price Summary by Quality Grade

Hay Grade	*Bale type*	*---------- Price ($/ton) ----------*		
		Average	Minimum	Maximum
Prime (> 151 RFV/RFQ)	Small Square	$253.00	$180.00	$330.00
	Large Square	$225.00	$150.00	$300.00
	Large Round	$170.00	$150.00	$180.00
Grade 1 (125 to 150 RFV/RFQ)	Small Square	$197.00	$155.00	$280.00
	Large Square	$168.00	$120.00	$235.00
	Large Round	$147.00	$59.00	$205.00
Grade 2 (103 to 124 RFV/RFQ)	Small Square		No Reported Sales	
	Large Square	$108.00	$42.00	$200.00
	Large Round	$129.00	$50.00	$180.00
Grade 3 (87 to 102 RFV/RFQ)	Small Square		No Reported Sales	
	Large Square	$145.00	$95.00	$185.00
	Large Round	$114.00	$98.00	$160.00

University of Wisconsin-Extension

New Agriculture Apps for IOS and Android

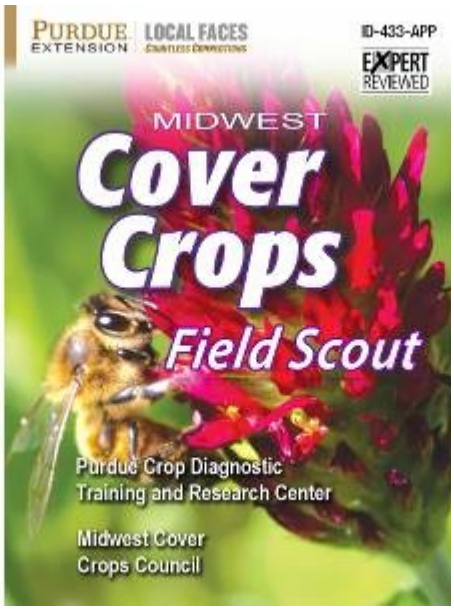
UW-Extension Pricing Standing Hay App

Just in time for first crop hay in 2018 the UW-Extension pricing standing hay app is now available in both Android and IOS versions. iPhone and iPad users can find the free app at https://itunes.apple.com/us/app/hay-pricing/id1381165835?mt=8 or search the App Store for "Hay Pricing". The IOS version also includes links to the latest edition of the Alfalfa Management Guide and 2017 WI Custom Rate Guide. The Android version is still available on Google Play at https://play.google.com/store/apps/details?id=com.smartmappsconsulting.haypricing with the latest reference material updates expected before the end of May.

According to Greg Blonde, Waupaca County UW-Extension Agriculture Agent, both the Android and Apple versions of this app provides easy access to current hay price information for most major hay producing states making it an essential tool for any farmer or Ag professional involved in buying or selling standing hay. The app quickly calculates a standing value per acre for each cutting, as well as the entire growing season, based on individual yield and harvest cost estimates. Blonde says, "with more standing hay being negotiated this year due to above normal winter kill and more farmers deciding to cut back or retire, the app can be an important tool in helping both parties determine a floor or ceiling price for buying or selling standing hay". For more information, contact Greg Blonde at greg.blonde@ces.uwex.edu.

Midwest Cover Crop Field Guide

The Midwest Cover Crops Council (MCCC) has reformatted its popular field guide to create the Midwest Cover Crops Field Scout mobile app for cellphones and tablets. The app allows farmers, crop advisers and conservation professionals to access vital cover crop information from mobile devices.



"The app improves upon the printed pocket guide by providing useful links to more in-depth articles on many topics covered in the printed guide," said Anna Morrow, MCCC program manager. "The digital version of the guide also provides additional photos beyond what's found in the printed guide."

Once downloaded, the content of the app will be available at any time on a mobile device. Internet connection will not be required to view cover crop information in the field.

The app is available for both iOS and Android devices with an annual subscription for $2.99. The subscription fee allows the MCCC to periodically update the app throughout the year with the latest available content.

Users will receive a renewal reminder when their subscription is nearing its end. Bulk purchase will be available for companies and field day organizers, allowing groups to offer free downloads at special events.

The app can be found by searching "cover crop" in either the App Store or Google Play, and direct links are available on the MCCC website at http://mccc.msu.edu/. The development of this app was made possible by the Walton Family Foundation.

SUMMER 2018 FARM MACHINERY/ TRACTOR SAFETY CLASSES

SPECIFIC COURSE INSTRUCTION AND OUTCOMES:

- Safe operation and maintenance of farm machinery including skid steers and tractors over 20 horsepower
- Follow rules of the road for machinery and tractor safety
- Apply emergency first aid training
- Handle agriculture fires and extinguishers

This course will provide youth primarily under the age of 16, but not younger than 12, with the necessary training and preparation to take the evaluation test. Students who successfully pass the test and proficiency skills evaluation will be granted a state certificate of completion.

The state certificate will allow students who are at least 12 years old to work for their parents or guardians operating equipment and tractors on public roads. The federal certificate allows students 14 years of age to work for someone other than their parents in operating equipment and tractors on public roads. Students should have prior tractor operating experience.

GREEN BAY

Class #:	51607
Course Fee:	$85.02
Date:	Monday - Thursday June 18 - June 21
Time:	9 a.m. - 3 p.m.
Location:	Green Bay Campus Transportation Center Room 102

SHAWANO

Class #:	51608
Course Fee:	$85.02
Date:	Mon-Tues-Thurs-Fri June 18 - June 21
Time:	9 a.m. - 3 p.m.
Location:	Shawano Regional Learning Center

LUXEMBURG

Class #:	51837
Course Fee:	$85.02
Date:	Monday - Thursday June 25 - June 28
Time:	9 a.m. - 3 p.m.
Location:	Luxemburg Regional Learning Center

TO REGISTER

ONLINE Registration

- Go to **nwtc.edu**
- Click on **Students** in the upper right hand corner
- Click onto **my.NWTC**
- Log In
- Click **Find a Class**

Phone-In Registration

To register with one of our friendly Enrollment Services staff, please call: 920-498-5444 or 888-385-NWTC.

Walk-In Registration

Register in person at any NWTC campus or regional learning center.

Additional Information

Call Bonnie, Trades Office, at 920-498-5457.

PLEASE NOTE:

THESE CLASSES ARE SUBJECT TO CANCELLATION IF THERE AREN'T 20 STUDENTS ENROLLED IN THE CLASS.

NWTC does not discriminate on the basis of age, race, color, disability, sex, national origin, or other protected class. 71394TET hg 5_18

TRADES & ENGINEERING TECHNOLOGIES – TRACTOR SAFETY

Northeast Wisconsin Technical College
2740 W MASON ST
P O BOX 19042
GREEN BAY WI 54307-9042

ADDRESS SERVICE REQUESTED

2018 Youth Tractor and Machinery Safety Training

UW Extension Cooperative Extension

Your county extension office

Pound Town Hall – Coleman, WI

Mondays & Wednesdays, July 16, 18, 23, and 25

Makeup days will be scheduled if needed.

Cost: $35/person **9 a.m. to 3:15 pm each day**

Who Needs To Attend the Training? Any 12 to 15-year old who may need to drive any type of farm machinery on a public road in Wisconsin. Others are welcome to attend the course, but only those older than 12 will receive certification. Those 16 years old and older without a valid driver's license can also utilize this training to be legal to drive farm machinery on public roads.

Legal Review: In Wisconsin, 14 and 15 year-olds who have successfully passed the Wisconsin Safe Operation of Tractor and Farm Machinery Course can legally drive farm machinery on public roads for their parents or grandparents' farms AND can work for other farms and do the same. 12 and 13-year olds who have completed the course can legally drive farm machinery on public roads only when working for their parents or grandparents' farms. If you employ persons under 15 years or who do not have a driver's license, it is highly recommended that you have them attend the training, whether they drive on public roads or not, as this is a good all-around safety training (and you should be collecting a copy of their federal permit from them). You may want to talk to your insurance agent to double-check about requirements based on your insurance policy.

Some Logistics:

– State law mandates 24 hours of training for this program. If participants are not going to be able to attend one of the scheduled days, we will figure out an acceptable make-up day that matches our schedules to allow them to complete the course. **Wednesday, July 25 is testing day and all participants MUST be in attendance.**

– Participants need to bring their own lunches, a refrigerator will be available for storage. Families are welcome to provide snacks, Scott will have water and/or lemonade and/or milk available.

– The course will emphasize hands-on and skill-building exercises, including first aid and fire safety from local emergency response personnel. We will be analyzing machinery for safety aspects, conducting on-farm safety assessments, and dozens of other activities, along with videos and course material review.

Call Scott at the Marinette County UWEX office, at either 715-732-7510 or toll-free 1-877-884-4408 if you have any questions, or you can e-mail to scott.reuss@ces.uwex.edu

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Registration Form - Tractor & Machinery Safety Training - please print

Name(s):_____ Age(s): _____

Mailing Address: _____

City: _____ Zipcode:_____

Emergency Contact Telephone Number:_____

Please complete this form and mail to the following address by July 13, with a check for $35 per participant and made payable to UW-Extension. OR contact Scott with the above information by then!

Marinette County UW-Extension
1926 Hall Avenue
Marinette, WI 54143

University of Wisconsin-Extension

Sandy Stuttgen, Agriculture Educator
UW-Extension Taylor County
925 Donald St, Room 103
Medford, WI 54451
Sandy.stuttgen@ces.uwex.edu
715-748-3327 x 1
http://taylor.uwex.edu/

Press Release

May 25, 2018

FOR IMMEDIATE RELEASE

Beef and dairy farmers are invited to attend a University of WI-Extension BQA-Transportation Certification & BQA Refresher on June 12, 2018 at the Zuck Cattle Company, Jim & Kathy Zuck & Family, W7302 County Road P, Ladysmith, WI. The evening begins with registration at 4:30 pm; training begins promptly at 5 pm.

This certifying event includes a lite supper, hands on and classroom activities, and printed materials for future reference. Due to generous support from Heartland Cooperative Services, Cargill and NCBA, and the Wisconsin Beef Council, we are able to provide a low-cost event: $10/person or $15/ two people per same farm, payable at the door. Attendees will earn BQA-Transportation Certification and One BQA Continuing Education Credit.

RSVP is required by June 7 by calling 715-748-3327 ext 3, leaving your name, phone number and number attending. This is a rain or shine event. Wear washable footwear. Bring your own lawn or bag chair.

Beef Quality Assurance (BQA) and BQA-Transportation do more than just help those raising dairy and beef to capture more value from their market cattle: BQA also reflects a positive public image and instills consumer confidence in the beef industry. Implementing BQA best management practices, including how cattle are transported, assures market steers, heifers, cows, and bulls are the best they can be. The stakes are even higher today because of increased public attention on animal welfare. Various markets are requiring proof of BQA and BQA-Transportation Certifications.

BQA is valuable to all beef and dairy farmers because it demonstrates commitment to food safety and quality, safeguarding the public image of the cattle industry while upholding consumer confidence in valuable beef products. BQA programs enhance herd profitability through better management, and protect farmers from additional and burdensome government regulation.

To register, or for more information, contact UW-Extension Taylor County, 715-748-3327 ext.3

SUMMER FIELD DAY

University of Wisconsin-Extension

GRAIN CROP MANAGEMENT

Should improving soil health be part of our pest management plan?

Jamie Patton

Senior Outreach Specialist, UW-Madison Nutrient and Pest Management Program

Developing a spray program to combat herbicide-resistant weeds

Dr. Rodrigo Werle

UW-Extension Cropping Systems Weed Scientist

Strip tillage and soybean management

Dr. Shawn Conley

UW-Extension Soybean and Small Grains Specialist

Fusarium head blight (scab) in wheat

Annie Deutsch

UW-Extension Door County Agriculture Agent

WHEN

June 12th, 2018
9am - 12pm

WHERE

Brickner-Meikle Family Farm

7377 Sand Bay Rd.,
Sturgeon Bay, WI

FREE registration

CCA Credits Applied For

PLEASE RSVP BY JUNE 8

https://uwex.qualtrics.com/fielddayregistration

Or call the Door County Extension Office

920-746-2260

Please contact us for special assistance regarding our programs at 920-388-7141. Requests are confidential.
UW-Extension provides equal opportunities in employment and programming, including Title VII, IX, and ADA.

USDA United States Department of Agriculture

2018 Summer Pasture Walks

Waupaca County

Justin Seeger- E5944 County Road G Marion, WI 54950

Thursday June 28th -10 a.m. to 12 p.m.

Justin has been rotationally grazing since 2015. His herd consists of 100 Angus cow calf pairs and 15 heifers. The farm currently has 200 acres under pasture with 60 acres of forest that was harvested this past winter and is currently being converted to pasture. The farm has an additional 265 acres of cropland that is managed to improve soil health using no-till, cover crops and livestock integration. The cover crops are used as forage and grazed by the livestock to extend the grazing season into the winter months. Justin will discuss things to consider when grazing cover crops and look at what it takes to convert forest to pasture.

Bouressa Family Farm- N3775 Ritchie Road New London, WI 54961

Tuesday July 17th -1 p.m. to 3 p.m.

Bouressa Family Farms raises a 100% grass fed and finished beef herd of British White Park cattle. Livestock are on pasture year-round, managed with daily moves during the growing season and fed round bales on pasture during the winter month. The farm is managed using a holistic approach focused on diversifying and incorporating permaculture practices. Bouressa Family Farms direct markets beef products throughout the state. Join us to learn more about direct marketing and ways you can diversify your rotational grazing operation.

Steve Rosenow- E9451 Kanaman Road New London, WI 54961

Thursday August 2nd -5 p.m. to 7 p.m.

Steve currently rotationally grazes 30 Hereford cow/calf pairs on 30 acres of pasture year-round. During the growing season animals are moved daily. During the non-growing season, the livestock are rotated through a winter bale grazing system. Steve is working on adding additional acreage through a SARE grant by thinning and converting 30 acres of a spruce and pine plantation previously in managed forest law to a silvopasture system along with an additional 30 acres of mixed hardwoods. We'll look at how the project has progressed in its first year and discuss things learned and things to consider when converting to a silvopasture system.

For more information or to RSVP contact:
Derrick Raspor-920-740-5810
derrick.raspor@wi.usda.gov

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Natural Resources Conservation Service
nrcs.usda.gov/

Dairy Situation and Outlook, May 18, 2018
By Bob Cropp, Professor Emeritus
University of Wisconsin Cooperative Extension
University of Wisconsin-Madison

The outlook for milk prices continues to improve. May is experiencing increases in dairy product prices. If these dairy product prices can hold, average May prices compared to April on the CME could average about 4 cents per pound higher for butter, about 14 cents for cheddar barrels, 4 cents for 40-pound cheddar blocks, 8 cents for nonfat dry milk, and 3 cents dry whey. As a result the May Class III price would be near $15.25 compared to $14.47 in April the low of $13.40 back in February. The May Class IV price would be near $14.45 compared to $13.48 in April and the low of $12.87 back in February.

Good domestic sales and dairy exports have improved the dairy stock situation and adding strength to the dairy product prices. Compared to a year earlier March 31st stocks of butter was just 0.4% higher with American cheese slightly lower at 0.4%, but other than American cheese stocks were 14.2% higher bringing total cheese stocks 5.2% higher. The strength in nonfat dry milk prices is surprising since stocks were still 20.9% higher than a year ago. Dry whey stocks which have been relatively high were 3.5% lower than a year ago.

The price of butter, cheese, nonfat dry milk and dry whey remain lower than and competitive with world market prices. U.S. dairy exports set a record high in March on a total volume basis surpassing the previous record high set in March 2014. Compared to March a year ago butterfat exports were 180% higher, cheese 9% higher, nonfat dry milk/skim milk powder 38% higher and dry whey 19% higher. March exports as a percent of milk production on a total solids basis was 17.3% compared to 14.1% a year ago. The outlook for dairy exports appears positive for the immediate months ahead.

Milk prices will continue to strengthen and possibility topping out in October or November. The degree of strength will continue to depend upon the level of milk production and dairy exports. The summer weather, quality of forages harvested and the condition of the corn and soybean crop that will impact feed costs will have a bearing on milk production this summer, fall and into winter.

USDA's report for April milk production was positive for milk prices. Compared to April a year ago milk production was just 0.6% higher. Milk cow numbers declined slightly, down 2,000 head from March, the second consecutive monthly decline. April milk cow numbers were just 8,000 head or 0.1% higher than a year ago. The April increase in milk per cow continues to increase much less than the normal trend being just 0.5% higher.

April milk production was lower than a year ago in major dairy states. Decreases were: New York -2.4%, Pennsylvania -1.7%, Michigan -1.4%, Minnesota -2.2% and Wisconsin -0.6%. There was relatively small increases in California +0.4%, Arizona +1.1%, Iowa +1.6% and South Dakota +1.8%. Relatively strong increases occurred in Idaho +3.5%, Texas +7.0%, Colorado +9.9%, Kansas +5.1% and Utah +5.5%.

It now looks like the Class III price could reach near $16 in June and the mid to high $16's by July and for the remainder of the year. The average for the year could end up near $15.60 compared to $16.17 last year. The Class IV price could be in the low $15's in June and then in the mid to high $15's the remainder of the year even reaching $16 by October averaging near $14.70 compared to $15.16 last year. Dairy margins (returns over feed cost) will improve but the improvement is now being dampen some by higher feed prices.

Equivalent Purchase Price/Ton* of Hay & Haylage at Various Moistures

by: Mike Ballweg, Sheboygan County Agriculture Agent and Gary Frank, Center for Dairy Profitability

		Market Hay Price Per Ton at 15 Percent Moisture									
Moisture %	**Hay Eq. Tons**	**$65.00**	**$70.00**	**$75.00**	**$80.00**	**$85.00**	**$90.00**	**$95.00**	**$100.00**	**$105.00**	**$110.00**
15	1.000	$65.00	$70.00	$75.00	$80.00	$85.00	$90.00	$95.00	$100.00	$105.00	$110.00
17	0.976	$63.47	$68.35	$73.24	$78.12	$83.00	$87.88	$92.76	$97.65	$102.53	$107.41
19	0.953	$61.94	$66.71	$71.47	$76.24	$81.00	$85.76	$90.53	$95.27	$100.06	$104.82
21	0.929	$60.41	$65.06	$69.71	$74.35	$79.00	$83.65	$88.29	$92.94	$97.59	$102.24
23	0.906	$58.88	$63.41	$67.94	$72.47	$77.00	$81.53	$86.06	$90.59	$95.12	$99.65
25	0.882	$57.35	$61.76	$66.18	$70.59	$75.00	$79.41	$83.82	$88.24	$92.65	$97.06
27	0.859	$55.82	$60.12	$74.41	$68.71	$73.00	$77.29	$81.59	$85.88	$90.18	$94.47
29	0.835	$54.29	$58.47	$62.65	$66.82	$71.00	$75.18	$79.35	$83.53	$87.71	$91.88
31	0.812	$52.76	$56.82	$60.88	$64.94	$69.00	$73.06	$77.12	$81.18	$85.24	$89.29
33	0.788	$51.24	$55.18	$59.12	$63.06	$67.00	$70.94	$74.88	$78.82	$82.76	$86.71
35	0.765	$49.71	$53.53	$57.35	$61.18	$65.00	$68.82	$72.65	$76.47	$80.29	$84.12
37	0.741	$48.18	$51.88	$55.59	$59.29	$63.00	$66.71	$70.41	$74.12	$77.82	$81.53
39	0.718	$46.65	$50.24	$53.82	$57.41	$61.00	$64.59	$68.18	$71.76	$75.35	$78.94
41	0.694	$45.12	$48.59	$52.06	$55.53	$59.00	$62.47	$65.94	$69.41	$72.88	$76.35
43	0.671	$43.59	$46.94	$50.29	$53.65	$57.00	$60.35	$63.71	$67.06	$70.41	$73.76
45	0.647	$42.06	$45.29	$48.53	$51.76	$55.00	$58.24	$61.47	$64.71	$67.41	$71.18
47	0.624	$40.53	$43.65	$46.76	$49.88	$53.00	$56.12	$59.24	$62.35	$65.47	$68.59
49	0.600	$39.00	$42.00	$45.00	$48.00	$51.00	$54.00	$57.00	$60.00	$63.00	$66.00
51	0.576	$37.47	$40.35	$43.24	$46.12	$49.00	$51.88	$54.76	$57.65	$60.53	$63.41
53	0.553	$35.94	$38.71	$41.47	$44.24	$47.00	$49.76	$52.53	$55.29	$58.06	$60.82
55	0.529	$34.41	$37.06	$39.71	$42.35	$45.00	$47.65	$50.29	$52.94	$55.59	$58.24
57	0.506	$32.88	$35.41	$37.94	$40.47	$43.00	$45.53	$48.06	$50.59	$53.12	$55.65
59	0.482	$31.35	$33.76	$36.18	$38.59	$41.00	$43.41	$45.82	$48.24	$50.65	$53.06
61	0.459	$29.82	$32.12	$34.41	$36.71	$39.00	$41.29	$43.59	$45.88	$48.18	$50.47
63	0.435	$28.29	$30.47	$32.65	$34.82	$37.00	$39.18	$41.35	$43.53	$45.71	$47.88
65	0.412	$26.76	$28.82	$30.88	$32.94	$35.00	$37.06	$39.12	$41.18	$43.24	$45.29
67	0.388	$25.24	$27.18	$29.12	$31.06	$33.00	$34.94	$36.88	$38.82	$40.76	$42.71

*If you harvest the hay or haylage, subtract the harvesting costs. Of course the price you pay will be determined by supply and demand conditions in your area and negotiations between you and the seller.

Equivalent Purchase Price/Ton* of Hay & Haylage at Various Moistures

by: Mike Ballweg, Sheboygan County Agriculture Agent and Gary Frank, Center for Dairy Profitability

		Market Hay Price Per Ton at 15 Percent Moisture									
Moisture %	**Hay Eq. Tons**	**$115.00**	**$120.00**	**$125.00**	**$130.00**	**$135.00**	**$140.00**	**$145.00**	**$150.00**	**$155.00**	**$160.00**
15	1.000	$115.00	$120.00	$125.00	$130.00	$135.00	$140.00	$145.00	$150.00	$155.00	$160.00
17	0.976	$112.29	$117.18	$122.06	$126.94	$131.82	$136.71	$141.59	$146.47	$151.35	$156.24
19	0.953	$109.59	$114.35	$119.12	$123.88	$128.65	$133.41	$138.18	$142.94	$147.71	$152.47
21	0.929	$106.88	$111.53	$116.18	$120.82	$125.47	$130.12	$134.76	$139.41	$144.06	$148.71
23	0.906	$104.18	$108.71	$113.24	$117.76	$122.29	$126.82	$131.35	$135.88	$140.41	$144.94
25	0.882	$101.47	$105.88	$110.29	$114.71	$119.12	$123.53	$127.94	$132.35	$136.76	$141.18
27	0.859	$98.76	$103.06	$107.35	$111.65	$115.94	$120.24	$124.53	$128.82	$133.12	$137.41
29	0.835	$96.06	$100.24	$104.41	$108.59	$112.76	$116.94	$121.12	$125.29	$129.47	$133.65
31	0.812	$93.35	$97.41	$101.47	$105.53	$109.59	$113.65	$117.71	$121.76	$125.82	$129.88
33	0.788	$90.65	$94.59	$98.53	$102.47	$106.41	$110.35	$114.29	$118.24	$122.18	$126.12
35	0.765	$87.94	$91.76	$95.59	$99.41	$103.24	$107.06	$110.88	$114.71	$118.53	$122.35
37	0.741	$85.24	$88.94	$92.65	$96.35	$100.06	$103.76	$107.47	$111.18	$114.88	$118.59
39	0.718	$82.53	$86.12	$89.71	$93.29	$96.88	$100.47	$104.06	$107.65	$111.24	$114.82
41	0.694	$79.82	$83.29	$86.76	$90.24	$93.71	$97.18	$100.65	$104.12	$107.59	$111.06
43	0.671	$77.12	$80.47	$83.82	$87.18	$90.53	$93.88	$97.24	$100.59	$103.94	$107.27
45	0.647	$74.41	$77.65	$80.88	$84.12	$87.35	$90.59	$93.82	$97.06	$100.29	$103.53
47	0.624	$71.71	$74.82	$77.94	$81.06	$84.18	$87.29	$90.41	$93.53	$96.65	$99.76
49	0.600	$69.00	$72.00	$75.00	$78.00	$81.00	$84.00	$87.00	$90.00	$93.00	$96.00
51	0.576	$66.29	$69.18	$72.06	$74.94	$77.82	$80.71	$83.59	$86.47	$89.35	$92.24
53	0.553	$63.59	$66.35	$69.12	$71.88	$74.65	$77.41	$80.18	$82.94	$85.71	$88.47
55	0.529	$60.88	$63.53	$66.18	$68.82	$71.47	$74.12	$76.76	$79.41	$82.06	$84.71
57	0.506	$58.18	$60.71	$63.24	$65.76	$68.29	$70.82	$73.35	$75.88	$78.41	$80.94
59	0.482	$55.47	$57.88	$60.29	$62.71	$65.12	$67.53	$69.94	$72.35	$74.76	$77.18
61	0.459	$52.76	$55.06	$57.35	$59.65	$61.94	$64.24	$66.53	$68.82	$71.12	$73.41
63	0.435	$50.06	$52.24	$54.41	$56.59	$58.76	$60.94	$63.12	$65.29	$67.47	$69.65
65	0.412	$47.35	$49.41	$51.47	$53.53	$55.59	$57.65	$59.71	$61.76	$63.82	$65.88
67	0.388	$44.65	$46.59	$48.53	$50.47	$52.41	$54.35	$56.29	$58.24	$60.18	$62.12

*If you harvest the hay or haylage, subtract the harvesting costs. Of course the price you pay will be determined by supply and demand conditions in your area and negotiations between you and the seller.

Focus on Forage

Wisconsin TEAM Forage

Sorghums, Sudangrasses, and Sorghum-Sudan Hybrids

by **Dan Undersander**

What are the different types of sorghum and sudangrasses?

Sorghums and sudangrasses are warm weather crops and will perform best in years when the growing season is characterized by higher than average temperatures. Cool conditions will severely limit productivity. Sorghums are diverse but generally fall into the following categories:

Grain Sorghum - also called milo, used for grain production in arid regions. This type grows 3 to 5 feet tall depending on variety and conditions. It is usually not considered for forage production because of low dry matter yield.

Forage Sorghums - includes sorgo, sweet sorghum, dual purpose (grain and forage) varieties, and hybrids. They usually grow 8 to 13 feet tall. Major use is for silage. Stems and leaves are similar in size to corn. Yields in central and southern Wisconsin have ranged from 3 tons/A in cool years to 11 tons/A dry matter in years with above average temperatures. Feeding value of sorghum silage is 80-90% that of comparable corn silage. Some long season and/or non-flowering types will need to be killed by frost to dry down enough for ensiling.

Sudangrass - grows from 4 to 7 feet tall, has leaves about ½ inch wide and stems about ¼ inch in diameter. It can be harvested as pasture, green chop, hay, or silage. Yields have ranged from 3 to 5 tons/A dry matter. It can be ready for harvest as early as 45 days after planting. The smaller stems give it better drying characteristics than other sorghums for hay making. Sudangrass hybrids are available that are slightly larger and higher yielding.

Sorghum-sudangrass Hybrids - are intermediate in plant size between sorghum and sudangrass. Yield is generally less than that for forage sorghums but similar or slightly higher than sudangrass. It can be used for hay, haylage, green-chop, and pasture. Larger stems make drying for hay more difficult than for sudangrasses.

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When and how should sorghums and sudangrasses be seeded?

Sorghums and sudangrasses should be seeded after the soil temperature has reached 60 to 65 ^{o}F. This is normally 3 weeks after corn planting (May 20 in southern WI to June 1 in central WI). Sorghum can be established either by conventional or reduced tillage methods. Soil pH should be between 6 and 7.5 with 6.5 being considered optimum. Recommended seeding depth for all sorghums is ¾ to 1¼ inches in heavy soils and up to 2 inches in sands. Seed at the rate of 12-15 lbs/A. Sorghums are normally seeded with a corn planter using 20 to 30-inch row spacing. Sudangrass is usually seeded with a grain drill at 20 to 30 lbs/A using 6 to 7-inch row spacing. Sorghum-sudangrass hybrids can be seeded either way at 20 to 30 lbs/A, depending on intended use (hay or silage).

What is the concern about prussic acid poisoning?

Sorghum and sudangrass plants contain a compound called dhurrin, which can break down to release prussic acid (hydrogen cyanide, HCN). Sudangrass has low levels of this compound and rarely kills animals. Sorghum has the highest levels and sorghum-sudangrasses are intermediate. There is also considerable varietal difference in prussic acid content for all types of sorghums.

Dhurrin content is highest in young plants. Therefore, the recommendation is not to graze or cut for green chop until the plant is 18 to 20 inches tall. This also applies to young regrowth in pastures. After a drought, new shoots may appear and the grazing cattle will switch from the taller forage to the new tender shoots. In addition, do not graze or green chop for 10 days after a killing frost.

High levels of nitrogen fertilizer or manure will increase the likelihood of prussic acid poisoning as well as nitrate poisoning. Very dark green plant growth often contains higher levels of prussic acid.

Most prussic acid is lost during the curing process. Therefore, hay and silage are seldom toxic even if the original forage was. Do not leave green chop in a wagon overnight and then feed. The heat that occurs will release prussic acid and increase likelihood of toxicity in the feed.

Individual animals vary in susceptibility to prussic acid poisoning. Cattle are more susceptible than sheep. Animals receiving grain with the sorghum forage are less likely to be affected.

When should sorghums and sudangrasses be harvested?

Silage - Forage sorghums should be harvested at the mid dough stage for ensiling. At this point, quality is still good and most types have dried down enough for ensiling. Non-heading types usually require a killing frost for the plant to get dry enough to ensile. This can be a problem in that lodging and leaf loss (therefore quality) may occur during the drying period after frost.

Hay - Highest yields are obtained when sudangrass and sorghum-sudangrass hybrids are harvested at the soft-dough stage (if a heading type). However, curing is difficult and quality is low when harvested this late. The general recommendation is to harvest either type for hay whenever forage is about 30 inches high. Sorghum-sudangrass hybrids are generally more difficult to make hay out of because of the larger stems. Crop should be cut six inches above the ground to encourage regrowth and two cuttings may be expected depending on yield

Green chop - Sudangrass and sorghum-sudangrass hybrids can be used to provide green chopped forage over summer. Begin chopping after the plant is 18 inches tall or cut at least 10 days after a killing frost to avoid prussic acid concerns. First cutting should be taken prior to heading.

Pasture - Sudangrass or sudangrass hybrids can be grazed any time after the plant has reached a height of 18 inches, which is usually 5 to 6 weeks after planting. For best results, it should be grazed rotationally with a sufficiently heavy stocking rate to remove forage down to a 6 to 8 inch height in a few days. The pasture will grow rapidly when the cattle are removed for more total tonnage. Additionally, if the grazing period is short, cattle will be less likely to be grazing regrowth that is high in prussic acid.

What is the feeding value of sorghums and sudangrasses?

Although these forages are generally similar to corn silage in feed value for beef cattle and sheep, there are some differences. Sudangrass grazed in its early vegetative stage contains as much available energy as corn silage and considerably more protein. However, mature sudangrasses and most sorghum and sudangrass silages are 15-20% lower in available energy than corn silage. This is because of the lower grain-to-forage ratios of the sorghums, and also because the seed coat is harder than corn and far more grain passes undigested through the animal. Crude protein levels are similar to corn silage, but they are rather variable and depend in part on the amount of nitrogen fertilization.

There are brown midrib forage sorghums, sorghum-sudangrass hybrids and sudangrasses. We would recommend using brown midrib types of any of these forages. These types have not had the extent of yield reduction associated with brown midrib in corn silage. Standability is not an issue with the brown midrib sorghum-sudangrass hybrids or the brown midrib sudangrasses. Research at Nebraska showed 13% more milk production from brown midrib forage sorghums than standard forage sorghums. Additional research in Indiana has shown benefit of brown midrib sorghum-sudangrass hybrids in beef rations.

Calcium and phosphorus levels of forage sorghums and sudangrasses are somewhat higher than corn silage, and the calcium-phosphorus ratio is better. Sorghum and sudangrass contain relatively high levels of potassium. Sheep producers should be aware that these forages evidently accumulate copper more than corn and often show copper levels of more than 30 ppm. This is usually not a problem for cattle, but sheep grazing or being fed sorghum and sudangrass forage should have access to a mineral mixture containing molybdenum and no additional copper.

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Focus on Forage

Wisconsin TEAM Forage

Feeding Strategies When Alfalfa Supplies are Short

by ***Randy Shaver***

Introduction

Limited snow cover to go along with a very cold winter leading to abnormally low soil temperatures has caused concern among forage agronomists (Ken Albrecht and Dan Undersander, UW Agronomy Dept.; personal communication) about extensive alfalfa winterkill. The concern about a potential alfalfa winterkill problem has spawned numerous dairy cattle feeding questions with regard to strategies for coping with potentially short alfalfa supplies.

Do a forage inventory

The first step is to take an inventory of forages that are in storage (i.e. corn silage, alfalfa silage, hay, etc.) and normal planned purchases (i.e. western hay) for comparison with forage needs. Remember to include an estimate for feeding losses and refusals into the calculation of forage needs (10% is a reasonable default value). For more information on performing a forage inventory, see the "Focus on Forage" fact sheet by Brian Holmes, *Making a Forage Inventory*.

Assess forage availability during summer

Alfalfa fields that are ultimately dropped from production due to winterkill will either be re-seeded or planted to emergency alternative forage crops (i.e. small-grain silage, soybean silage, sorghum-sudan grass silage, short-season corn silage, etc.). Assuming good growing conditions, the new seeding alfalfa fields and these alternative forage crops will provide tonnage to feed the dairy herd, but not until July or August and the quality will be highly variable.

So the inventory versus needs question is really one of how best to manage the feeding program from mid to late spring until new-crop forages are harvested in mid to late summer. If the inventory versus needs assessment reveals sufficient alfalfa stocks on hand to get through the summer feeding period, then there is no need to adjust herd diets to stretch supply. From the standpoint of cow health and productivity, it is usually better if possible to stretch alfalfa to last longer by feeding lesser amounts than to eliminate it totally from diets. A small negative differential between alfalfa inventory and needs for the summer feeding period may simply mean increasing the proportion of corn silage to alfalfa forage in diets for replacement heifers, milking cows or both and (or) minimizing feeding losses and refusals. A moderate to large negative differential between alfalfa inventory and needs for the summer feeding period will necessitate consideration of more drastic measures depending on the severity of the situation (i.e. feeding lower forage diets, purchasing and feeding higher amounts of high-fiber byproducts, purchasing and feeding higher amounts of hay, or feeding straw). Diet changes aimed at stretching forage supplies should be done under the supervision of a ration consultant.

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What are the considerations when formulating a minimum fiber diet?

With the aim of maintaining normal ruminal pH, fiber digestion and milk fat test and preventing acute and sub-acute ruminal acidosis (SARA) and displaced abomasums (LDA), dairy cattle diets can be formulated or evaluated for chemical fiber (NRC, 2001) and effective fiber (Armentano and Pereira, 1997; Mertens, 1997; NRC, 2001) minimums and non-fiber carbohydrate (NFC) maximums (Nocek, 1997; NRC, 2001).

Unlike other nutrients, such as protein and calcium, where requirements are provided in grams per cow per day for specific body weight and milk production levels, fiber “requirements” are merely minimum guidelines aimed at maintaining normal ruminal pH, fiber digestion and milk fat test and preventing SARA and LDA (NRC, 2001). NRC (2001) guidelines for minimum NDF from forage, minimum total diet NDF, and maximum diet NFC are presented in Table 1. Remember that these are fiber minimums and NFC maximums, and not recommended formulation targets for all situations.

Table 1 applies to diets containing ground corn as the primary starch source fed as TMR of adequate particle size, and assumes good feed delivery and bunk management practices. Greater formulation safety margins (i.e higher NDF from forage and total NDF minimums and lower NFC maximums) should be used in herds without TMR feeding or with inadequate TMR particle size, highly rumen fermentable starch sources (i.e. steam-flaked corn or high moisture corn versus dry corn), and (or) poor feed delivery and bunk management practices (Refer to Table 2). Adequate TMR particle size means having at least 8%

Table 1. Recommended minimum concentrations (% of DM) of NDF from forage and total diet NDF and recommended maximum concentrations (% of DM) of NFC for diets containing ground corn as primary starch source fed as TMR of adequate particle size (NRC, 2001).

Minimum NDF from forage	Minimum NDF in Diet	Maximum NFC in diet[1]
19%	25%	44%
18%	27%	42%
17%	29%	40%
16%	31%	38%
15%[2]	33%	36%

[1]Non-fiber carbohydrate = 100 – (%NDF – NDFIP + % CP + %Fat + %ash).
[2]Not recommended because of depression of milk fat test.

Table 2. Recommended minimum concentrations (% of DM) of NDF from forage and total diet NDF and recommended maximum concentrations (% of DM) of NFC for diets of lactating dairy cows fed in herds without TMR feeding or with inadequate TMR particle size, highly rumen fermentable starch sources (i.e. steam-flaked corn or high moisture corn versus dry corn), and (or) poor feed delivery and bunk management practices (adapted from NRC, 2001).

Minimum NDF from forage	Minimum NDF in Diet	Maximum NFC in diet[1]
19%	--	--
18%	--	--
--	29%	40%
--	31%	38%
--	33%	36%

[1]Non-fiber carbohydrate = 100 – (%NDF – NDFIP + % CP + %Fat + %ash).

to 10% retained on the top screen of the Penn State-Nasco shaker box with less than 50% found on the bottom pan (as-fed basis).

Low alfalfa inventory and high relative costs of fiber and other nutrients from purchased forages versus purchased high-fiber byproducts may create the need or desire to feed minimum forage diets. Diets with less than 19% NDF from forage should contain high-fiber byproducts to increase total diet NDF and reduce diet NFC (Refer to Table 1). Selected high-fiber byproducts and their respective NDF and NFC concentrations are presented in Table 3 for comparison with common forages and grains. In general, replacing grains with high-fiber byproducts has the effect of raising total diet NDF and reducing diet NFC. This practice is positive in low forage diets, as it aids in meeting the total diet NDF and NFC recommendations.

The NDF in high-fiber byproducts is not as effective as the NDF from forage for maintaining normal milk fat test (Armentano and Pereira, 1997). The exception to this is whole cottonseed where the NDF effectiveness factor relative to forage NDF is near 100% (Clark and Armentano, 1993). This is one of the main reasons why whole cottonseed has become such a common feed ingredient in low forage diets. The 15% NDF from forage row in Table 1 is not recommended, because a depression in milk fat test would be expected. Assuming an average NDF concentration for dietary forages of 45%, diet formulation for 19% or 16% NDF from forage would result in diets containing 42% or 35% forage (DM basis), respectively (Refer to Table 4).

Again, greater formulation safety margins (i.e higher NDF from forage and total NDF minimums and lower NFC maximums) should be used in herds without TMR feeding or with inadequate TMR particle size, highly rumen fermentable starch sources (i.e. steam-flaked corn or high moisture corn versus dry corn), and (or) poor feed delivery and bunk management practices (Refer to Table 2).

Table 3. Tabular mean NDF and NFC concentrations (% of DM; NRC, 2001) for selected forages, grains, and high-fiber byproducts.

Ingredient	NDF%	NFC%[1]
Alfalfa	35-50	20-30
Grasses	50-65	10-20
Corn Silage	45-55	30-40
Shelled Corn	9.5	75.4
Ear Corn	21.5	64.3
Alfalfa Meal	41.6	28.8
Beet Pulp	45.8	35.8
Brewers Grains	47.4	13.9
Canola Meal	29.8	25.9
Citrus Pulp	24.2	56.8
Corn Gluten Feed	35.5	30.4
Cottonseed Hulls	85.0	3.5
Cottonseed Meal	30.8	19.0
Distillers Grains	38.8	16.3
Hominy	21.1	60.1
Linseed Meal	36.1	31.0
Malt Sprouts	47.0	23.2
Soybean Hulls	60.3	18.3
Sunflower Meal	40.3	27.7
Wheat Middlings	36.7	35.3
Whole Cottonseed	50.3	2.7

[1]Non-fiber carbohydrate = 100 – (%NDF – NDFIP + % CP + %Fat + %ash).

Table 4. Calculated forage concentration in the diet to meet minimum NDF from forage guidelines with forage of varying NDF concentration (DM basis).

Minimum NDF from forage	40% NDF forage	45% NDF forage	50% NDF forage
19%	48%[1]	42%	38%
18%	45%	40%	36%
17%	43%	38%	34%
16%	40%	35%	32%

[1]Dietary forage concentration as % of DM.

Feed delivery and bunk management

There are numerous errors in feed delivery and bunk management that can occur on commercial dairies. These include: errors in feed sampling and analyses, errors in ingredient DM adjustments, failure to evaluate forage and TMR particle size, failure to evaluate grain moisture content and degree of processing, errors in ingredient feeding rates, mixing errors including over-mixing that causes particle size reduction, and feed sorting).

Close attention should be paid to proper feed delivery and bunk management practices, especially when implementing diet changes aimed at stretching forage supplies. Factors that may make TMR prone to sorting include: DM content and particle size of forage and mix, variation in bulk density of feed ingredients, large pieces of cobs and husks in the corn silage, amount and quality of hay added to mix, improper sequencing of ingredients into the mixer, frequency of feeding and push-up, availability of bunk space, and bunk access time. An on-farm evaluation of sorting should include particle size determination of TMR, bunk mix, and refusals.

If sorting is determined to be a problem, then one or more of the following options may need to be considered: feeding smaller amounts of TMR more frequently, adding less hay to the mix, processing hay finer, using higher quality hay, using hay that is more pliable, processing corn silage, addition of water to dry TMR, and addition of a liquid feed supplement to TMR.

What roughage sources can be substituted for alfalfa haylage?

Presented in Table 5 are example calculations of forage replacement values for alternative roughage sources and high-fiber byproducts. The feeding 5 lb./cow/day DM from coarse-chopped hay can replace 5.5 to 7.0 lb./cow/day of haylage DM. In theory, coarse-chopped straw could replace up to 10.5 lb. of haylage DM. But, in practice straw is usually limited to 2 to 4 lb./cow/day for milking cows to formulate diets of sufficient energy density resulting in a potential haylage DM replacement of 4 to 8 lb./cow/day. Feeding 5 lb./cow/day DM from high-fiber byproducts replaces only 2.0/cow/day haylage DM on average, except for whole cottonseed and cottonseed hulls with haylage replacement values of 6 and 10 lb./cow/day DM, respectively, at 5 lb./cow/day DM feeding rates. High forage replacement with cottonseed hulls should coincide with the feeding of coarse-chopped dry hay to provide adequate rumen mat formation. Because of poor growing and harvest conditions for the 2002 cotton crop, whole cottonseed quality (moisture, mold, mycotoxins, and free fatty acids) and price need to be closely evaluated when deciding whether or not to feed whole cottonseed or how much to feed. Ration consultants and feed suppliers should be called upon to assist with evaluating the potential for using whole cottonseed to stretch forage supplies.

Suggested feeding limits for selected high-fiber byproducts are presented in Table 6 (Adapted from Howard, 1988). Actual amounts fed should be determined by formulation of diets for requirements and limits for nutrients, such as CP, RUP, RDP, NDF, NFC, fat and P, especially when multiple high-fiber byproducts are used in the same diet. For a detailed discussion of by-product feeds, the following internet publication is recommended: http://www.wisc.edu/dysci/uwex/nutritn/pubs/ByProducts/ByproductFeedstuffs.html . Break-even prices for byproduct feeds can be calculated using FEEDVAL4 (Howard and Shaver, 1993) with blood meal (rumen undegraded protein), urea (rumen degraded protein), shelled corn (energy), tallow (fat), dicalcium phosphate (phosphorus), and calcium carbonate (calcium) as referee feedstuffs. Break-even prices are not provided here, because actual break-even prices vary as prices of the referee feedstuffs change. These change from month to month, year to year, supplier to supplier, and location to location. Calculation of relevant breakeven prices is recommended. The FEEDVAL4 spreadsheet can be obtained at the following internet URL: http://www.wisc.edu/dysci/uwex/nutritn/spreadsheets/sprds.htm . Remember to input currently relevant prices for referee feeds into the spreadsheet so that the calculated breakeven prices from the spreadsheet are relevant.

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Table 5. Example calculations of forage replacement values for alternative roughage sources and high-fiber byproducts.

Ingredient	NDF[1] % of DM	pef[2] % of NDF	peNDF[3] % of DM	Replaces per lb. DM[4]	Replaces per 5 lb. DM
Replaced Haylage					
Medium Chop Length	45	85	38.3	--	--
Replacement Feeds					
Coarse Chopped Straw	73.0	110	80.3	2.1	10.5[5]
Coarse Chopped Grass Hay	55	95	52.3	1.4	7.0
Coarse Chopped Alfalfa Hay	45	90	40.5	1.1	5.5
Alfalfa Meal	41.6	40	16.6	0.4	2.0
Beet Pulp	45.8	30	13.7	0.4	2.0
Brewers Grains	47.4	40	19.0	0.5	2.5
Canola Meal	29.8	40	11.9	0.3	1.5
Citrus Pulp	24.2	30	7.3	0.2	1.0
Corn Gluten Feed	35.5	40	14.2	0.4	2.0
Cottonseed Hulls	85.0	90	76.5	2.0	10.0[6]
Cottonseed Meal	30.8	40	12.3	0.3	1.5
Distillers Grains	38.8	40	15.5	0.4	2.0[7]
Hominy	21.1	40	8.4	0.2	1.0
Linseed Meal	36.1	40	14.4	0.4	2.0
Malt Sprouts	47.0	40	18.8	0.5	2.5
Soybean Hulls	60.3	30	18.1	0.5	2.5
Sunflower Meal	40.3	40	16.1	0.4	2.0
Wheat Middlings	36.7	40	14.7	0.4	2.0
Whole Cottonseed	50.3	90	45.3	1.2	6.0[7]

[1]Adapted from NRC (2001).
[2]Physical effectiveness factors (% of NDF) adapted from Mertens (2002).
[3]Physically effective NDF (% of DM) calculated as NDF*(pef/100).
[4]Replacment value of feeds per lb. of DM for example haylage calculated as peNDF replacement feed divided by peNDF of haylage to be replaced.
[5]Straw usually limited to 2-4 lb./cow/day for milking cows to formulate diets of sufficient energy density.
[6]High forage replacement with cottonseed hulls should coincide with the feeding of coarse-chopped dry hay to provide adequate rumen mat formation. Actual feeding amount should be determined by dietary NDF and NFC guidelines provided in Table 1.
[7]Actual feeding amounts may be limited ingredient fat content.

Table 6. Suggested feeding limits for selected high-fiber byproducts[1].

Ingredient	Suggested Limits lb. DM per cow per day[2]
Alfalfa Meal	5 - 10
Beet Pulp	8 - 12
Brewers Grains	5 - 10
Canola Meal	5 - 10
Citrus Pulp	5 - 10
Corn Gluten Feed	10 - 15
Cottonseed Hulls	5 - 10
Cottonseed Meal	5 - 10
Distillers Grains	5 - 10
Hominy	10 - 15
Linseed Meal	5 - 10
Malt Sprouts	5 - 10
Soybean Hulls	8 - 12
Sunflower Meal	5 - 10
Wheat Middlings	8 - 12
Whole Cottonseed	5 - 8

[1]Adapted from Howard (1988).

[2]Actual amounts fed should be determined by formulation of diets for requirements and limits for nutrients, such as CP, RUP, RDP, NDF, NFC, fat and P, especially when multiple high-fiber byproducts are used in the same diet.

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