

A photograph of a farm scene. In the foreground, a group of cows of various colors (black, brown, and white) are grazing in a lush green field. In the background, a large irrigation system with multiple nozzles is visible, spraying water over the field. The sky is clear and blue, and there are trees in the distance.

Ammoniating Tube Wrapped Baleage

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Tribute Farm

- 678 acre dairy farm (85% irrigated), plus 470 acre support farm across the road (66% irrigated)
- Soils – free draining sands, some strips of silt on support farm.
- Milking 900 cows, increasing by +100 next 3 years.
- Replacements : 240 6-month calves, 180 18-month heifers
- Seasonal calving, retain open cows for extra year
- Farm is “closed” and almost self-contained for forages, buy in commodities, and cheap hay etc.

Feed Summary

- 2013 is our 3rd season of milking.
- Calculated pasture/forage eaten is 9717lbsDM/acre
- 2011 – fed approx 27% as supplement or commodities to milkers, the rest was grazed pasture/forage.
- 2012 – approx 31% as supplement.
- 2013 – estimated 36% as supplement.
- 2012 – 4055 bales made on farm, 1730 purchased.
- 2013 – 4100 bales made on farm, 360 purchased.

Why Ammoniation ??

We prefer not to have to, but...

Cheaper low quality feeds are available, but don't fit our criteria as-bought, or MADE!.

- Fescue hay
- Rice straw
- Over-mature forages such as cereal rye, annual ryegrass, millet.

Why Ammoniation ??

- Ammoniating hay is well proven, perhaps it might work for baleage
- Data here and overseas suggested a lift in protein of up to 4 points, and a lift in digestibility.
- It apparently accelerates cell wall breakdown, and associated lift in protein

Why Rice Straw, or millet or ARG ?

- They are available to us at Tribute !!
- What feeds are available to you??
- Fescue KY 31
- Over-mature cereal rye or Annual ryegrass
- Millet or sudangrass ??
- Your preference of high quantity, but average quality forage??



How to do this !!

- Trial and error on our part.
- Plenty of trial data on ammoniating hay.
- Research data suggests that that you could turn POOR quality feed (hay) into AVERAGE quality feed.
- BUT nothing about haylage/baleage !
- So we had to pioneer results for wrapped baleage.

How to do this !!

- We baled and wrapped 241 bales of rice straw in prime condition, no rain at harvest, wet weight 1700lbs. The bales typically have 5 layers of wrap.
- We tested 3 lines each of about 70 bales of whole-plant rice “straw” with the rice grains already shred-harvested. We mowed almost directly in front of the baler, with moisture measured at 60% at cutting.



How to do this !!

- We did multiple core samples of all lines to determine pre-ammoniating status. We repeated core sampling on the same bales some 21 days later.
- We have developed what we believe is a safe and efficient delivery mechanism for the ammoniation – We used a modified hand probe tube to inject under pressure the appropriate volume/weight of product.





How to do this !!

- We need 2 people to do this,
 - one injecting, and taping the hole afterwards
 - One for controlling the dispensing, and for safety, riding shotgun on the anhydrous tank, to cut supply if required, and monitor overall safety etc.
- The operator at the bale line had protective equipment, including goggles and gas masks.
- We only proceeded if a useful down-wind situation exists.



How to do this !!

- Initially we cut a hole in each bale, but by sharpening our spear, we ceased cutting.
- All holes were cleaned afterwards, then taped with quality silage tape.





How to do this !!

- For one line of bales, we injected EVERY bale,
- On the next line we injected every SECOND bale with double the amount of anhydrous ammonia.
- We did this for rice straw and also for over-mature millet, and cereal winter rye.
- We have results pending for over-mature annual ryegrass, harvested May 2013

Assumptions

- Bale weight = 1700lbs wet, at 40%DM = 680lbs. To allow for bale weight variations, we assumed 700lbsDM.
- 3% (N) of this 700lb DM weight is 21lbs of product to be injected, 2% (N) is 14lbs
- An-H is 82% N
- Weighs 5.14 lbs per gallon
- Anhydrous price \$960 per ton, which = 48c per lb, or also = \$2.47 per gallon

Assumptions (cont'd)

- Line 1 For the 3% injections we require 4.1 gallons per bale cost = approx. \$10.13 per bale
- Line 2 Will require 8.2 gallons to be injected into every 2nd space between bales: same cost as Line 1 treatment.
- Line 3 For the 2% injections we will require 2.7 gallons per bale: cost = approx. \$6.67 per bale.

Method

- We injected the appropriate amount of anhydrous ammonia, then taped over the small hole.
- Injecting was simple. We used a flow meter to measure and calibrate volume, and a stopwatch to measure time injecting.
- Once calibrated, we only used the stopwatch. The flow meter kept freezing anyway.
- We waited 3-8 weeks before sending in the samples, to compare pre & post ammoniation.

Results

- We used Analab (AgriKing) Illinois , and requested wet-chemistry on all samples, to silence the detractors of NIR samples only!
- Rice straw
 - lifted CP from 7.15 to 9.47
 - lifted pH from 4.93 to 5.4
 - Lifted soluble protein from 39.5 to 53.8
 - changed NDFD-30 from 35.9 to 38.9 – unsure of why??

Results

- Millet 1 – lifted CP from 8.14 to 12.08
 - Dropped pH from 5.1 to 4.6
 - Lifted soluble protein from 30.4 to 53.3
 - Dropped NDFD-30 from 56 to 44
- Millet 2 – lifted CP from 8.17 to 12.43
 - Dropped pH from 4.7 to 4.5
 - Lifted soluble protein from 45 to 59
 - Dropped NDFD-30 from 59 to 45

Conclusions

1. The process was not onerous or dangerous.
2. Injecting every bale with a single shot gave more consistent results than injecting every 2nd bale with double the nitrogen.
3. Ammoniation improved all feed, on average, in protein and digestibility, by about the expected results.
4. There was no rejection of ammoniated feed by any class of stock fed this material.

Conclusions

5. Ammonia was still evident weeks or months later, when opening the bale, so nitrogen loss was minimal.
6. Because of this, we did not feed into rings, everything went through the mixer wagon.
7. The economics appeared neutral, but there was no doubt that palatability improved.
8. We are continuing to investigate this option as a means of turning poor quality feed into average feed, suitable for dry cows and replacements.