Anderson TMR Mixer 101





Topics

• Mixer 101

- Why should i use a vertical mixer?
- Vertical Mixers how it work?
- Single Auger vs Twin Auger vs Triple Auger?
- Which auger RPM is the best for you?
- How to choose your TMR Mixer?
- Loading order Sequence
- Ration formula vs Cows grouping
- Shaker Box
- Common mistake when using a TMR
- TMR maintenance and common scale issue



Why should i use a Vertical Mixer?

- 4 rations that exist:
 - Ration on paper
 - Ration you feed (accuraty of the ingredient)
 - Ration your animals eat (homogeneity)
 - Ration your animals digest/utilize (effective fiber for optimal rumen function)
- Feeding objective = all the same!



Why should i use a Vertical Mixer?



- A healthy rumen = a healthy animal
 - Rumen Mat formation requires "Particle Length"
 - Rumination (chewing) requires "Scratch"
 - Sorting causes these to fail.



Why should i use a Vertical Mixer?

- Advantages:
 - Ability to mix the widest variety of materials
 - Can process large amounts of hay, even full round bales, large square bales and baleage
 - Simple drive system
 - Available with several discharge options
 - No more sorting = better control of cows input & output

- Applications:
 - Dairy
 - Cow/ Calf Beef
 - Any long fiber unprocessed forages
 - Baleage / wet bales / dry bales



Vertical Mixers – how it work

- Mixing is done by one, two or three augers
- The augers pick up and elevate the material vertically, thus creating the "up and down" feed mixing cycle
- The rotation of the augers gives the "front to back" feed mixing cycle
- The "open" mixing chamber allows for 100% bale processing capabilities





Vertical Mixers – how it work

- Augers gather material to the center and move it upward
- Hay stops slow movement around the tank for better processing and more upward feed movement
- Baffles in a twin or triple auger keep the feed movement onto the augers and promotes feed movement between front and rear augers
- Hay retention or side extensions available





Single Auger vs Twin Auger

- Single Narrow Auger
 - Smaller diameter
 - Tall loading height
 - Fit larger bale without spilling
 - Handles pre-process forages better

- Twin Auger
 - Lower loading height
 - Long and narrow
 - Fit best in older facilities with narrow alleys
 - Shorter mixing time then single auger for same capacity (40-50%) when processing long fibers
 - Same horsepower vs single auger for same auger RPM and cubic volume
 - Improved processing of wetter roughages
 - Tend to be more expensive with 2 planetary gearboxes
 - But better ROI than single mixer



More planetaries <u>DO NOT EQUAL</u> more HP

- Assuming comparison between two (2) TMR Mixer
- Same cubic feet capacity
- Same Auger RPM
- 1 Auger = Larger Auger = Higher HP per Auger
- 2 Augers = Narrower and smaller Auger = Lower HP per auger
- In the end, HP is the same
- Nothing gets lost, nothing gets created, everything gets transformed.



ROI of Twin Auger vs Single Auger

2 mix per day

	HP requir emen t	Mixin g Time /batc h	Nbr of batch /day	Mixing time total year (hr)	Tractor cost (fuel and maintenance) at 0,26\$/Hr/HP
600 Cu.ft 1 Auger	100	25	2	304,2	7,909\$
600 Cu.ft 2 Auger	100	15	2	182.5	4,745\$
Variat	3,164\$				
Avg. Price diff	10,000\$				
Payback	10,000/3,164= 3,1 yr				

3 mix per day

	HP requir emen t	Mixin g Time /batc h	Nbr of batch /day	Mixing time total year (hr)	Tractor cost (fuel and maintenance) at 0,26\$/Hr/HP			
600 Cu.ft 1 Auger	100	25	3	456,3	11,863\$			
600 Cu.ft 2 Auger	100	15	3	273.7	7116,2\$			
Variat	Variable cost difference per year							
Avg. Price o	10,000\$							
Payback	10,000/4,747= 2,1 yr							



Choosing your mixer

- When sizing a TMR mixer it is best to base it off of volume (cubic feet) and not lbs.
- Normal Dairy Cow will consume 5 to 7 cubic foot of a TMR ration per day
- All cut haylages, corn silage etc with no long stem hay a person can figure 5 cubic foot per day
- When using some long stem hay into the ration for rumen health (2-3 lbs) a person can figure 6 cubic foot per day
- When processing larger amounts of long stem hay, such as round bales in a vertical mixer a person can figure 7 cubic foot per day
- Using these numbers, take the max group or pen size you will be feeding, multiply it times the proper cubic feet and divide it by the number of times a day you plan on mixing and feeding
 - 200 cows x 5 cubic feet per cow = 1,000 cubic feet
 - If feeding twice a day, divide by 2 = minimum 500 cubic foot mixer



Choosing your mixer

TABLE #1: Assumes 5 cubic feet per cow per 5

This volume should be adequate for many rations NOT adding dry hay.

These are strictly estimates. Variations in material may affect size.

Cows Gro	up size	50	60	70	80	90	100	125	150	175	200	225	250	300
Nbr. Of	1	250	300	350	400	450	500	625	750	875	1000	1125	1250	1500
feed per	2	125	150	175	200	225	250	313	375	438	500	563	625	750
day	3	83	100	117	133	150	167	208	250	292	333	375	417	500

TABLE #2: Assumes 7 cubic feet per cow per

This volume should be adequate for many rations that INCLUDE up to 20% (by weight) dry hay. These are strictly estimates. Variations in material may affect size.

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Cows Gro	up size	50	60	70	80	90	100	125	150	175	200	225	250	300
Nbr. Of	1	350	420	490	560	630	700	875	1050	1225	1400	1575	1750	2100
feed per	2	175	210	245	280	315	350	438	525	613	700	788	875	1050
day	3	117	140	163	187	210	233	292	350	408	467	525	583	700

For mixer size in cubic feet capacity, read down from group size to number of feedings per day.

EXAMPLE: TABLE #2 — GROUP SIZE 100 — One feeding per day would require 700 cubic feet; two feedings, 350 cubic

feet; at three feedings per day, a 234 cubic foot mixer would handle the material.

For sizes larger than 250 per group, multiply the number of cows in the group by the cubic feet of feed per cow per day, and then divide that by the number of feedings per day.



Choosing your mixer – Cubic volume occupied by forage in round bales

Choosing your mixer – Cubic volume occupied by forage in round bales									
Round bale size: width x diameter (feet &	meter)								
Stage of processing	4x4 (1.2mx1.2m)	4x5 (1.2mx1.5m)	5x5 (1.5mx1.5m)	4x6 (1.2mx1.8m)	5x6 (1.5mx1.8m)				
Before processing	50	79	98	113	141				
Early processing	151	236	295	339	424				
Final processing	86	135	168	194	242				

Number of bale to not exceed in order to avoid over spillage(without hay retention ring)

TMR model	Cu.ft capacity	4x4 (1.2mx1.2m)	4x5 (1.2mx1.5m)	5x5 (1.5mx1.5m)	4x6 (1.2mx1.8m)	5x6 (1.5mx1.8m)
A280 (Single auger) struck level	282	3/4	2/4	2/4	1/4	1/4
A280 (Single auger) + 6 in capacity ext.	310	1	3/4	2/4	2/4	2/4
A280 (Single auger) + 12 in capacity ext.	338	1 1/4	1	3/4	2/4	2/4
A280 (Single auger) + 18 in capacity ext.	367	1 3/4	1	3/4	3/4	2/4
A380 (Single auger) struck level	380	1	3/4	2/4	2/4	2/4
A380 (Single auger) + 6 in capacity ext.	416	1 1/4	3/4	3/4	2/4	2/4
A380 (Single auger) + 12 in capacity ext.	453	1 3/4	1	3/4	3/4	2/4
A380 (Single auger) + 18 in capacity ext.	490	2 1/4	1 2/4	1	1	3/4
A520 (Twin auger) struck level	520	1 2/4	1	3/4	3/4	2/4
A520 (Twin auger) + 6 in capacity ext.	568	2	1 1/4	1	1	3/4
A520 (Twin auger) + 12 in capacity ext.	617	2 2/4	1 2/4	1 1/4	1	1
A520 (Twin auger) + 18 in capacity ext.	666	3	2	1 2/4	1 1/4	1
A700 (Twin auger) struck level	695	2	1 1/4	1	1	3/4
A700 (Twin auger) + 6 in capacity ext.	762	2 2/4	1 2/4	1 1/4	1	1
A700 (Twin auger) + 12 in capacity ext.	829	3	2	1 2/4	1 1/4	1
A700 (Twin auger) + 18 in capacity ext.	897	4	2 2/4	2	1 3/4	1 2/4
A950 (Triple Auger) struck level	953	2 3/4	1 3/4	1 2/4	1 1/4	1
A950 (Triple Auger) + 6 in capacity ext.	1038	3 2/4	2 1/4	1 3/4	1 2/4	1 1/4
A950 (Triple Auger) + 12 in capacity ext.	1125	4	2 2/4	2	1 3/4	1 2/4
A950 (Triple Auger) + 18 in capacity ext.	1212	5 2/4	3 2/4	2 3/4	2 2/4	2
A1230 (Triple Auger) struck level	1236	3 2/4	2 1/4	1 3/4	1 2/4	1 1/4
A1230 (Triple Auger) + 6 in capacity ext.	1348	4 2/4	2 3/4	2 1/4	2	1 2/4
A1230 (Triple Auger) + 12 in capacity ext.	1461	5 1/4	3 2/4	2 3/4	2 1/4	2
A1230 (Triple Auger) + 18 in capacity ext.	1575	7	4 2/4	3 2/4	3 1/4	2 2/4

- Vertical TMR mixer work at their best between 65-85% of mixer volume capacity
 - Under 65%, the feed will tend to travel around the auger, and the up and down movement of the feed will not be efficient.
 - Over 85%, the flow material of the feed will go around the auger, and up and down throught the tub. However, the top layer of the mix will not be mixed properly, and therefore the ration will be inconsistent.



Anderson Vertical TMR Mixer General Loading Order

- Remotely engage Anderson hay restriction blade
 - Long Stem processing
- Remotely disengage Anderson hay restriction blade to avoid overmixing and preserve further added ingredient structural integrity
 - Haylage
 - Corn silage
 - Grains/dry premixes/minerals
 - Wet Commodities
 - Water and or other Liquids



Formulating the ration

- Identify group of cows to be fed
 - Milk production
 - Days in milk
 - Dry Matter (DM) Intake
- Minimize variation in the group
 - Group cows that are similar in milk production and DM intake



Cows grouping for TMR

- Lactating cow groups
 - Fresh Cow
 - 1 to 21 days in milk
 - 1st Lactation cows
 - High Production older cows
 - 21 to 180 days in milk
 - Mid-lactation older cows
 - 180 to 250 days in milk
 - Late Lactation
 - Older and 1st lactation cows
 - 250 days in milk to dry off



Checking particle size of a TMR with the Penn State particle separator (Shaker Box)





"2 screen Shaker Box" How it works

- Designed to mimic the lab method for measuring forage and TMR particle sizes but for "on farm"
- Forage particle size analysis begins with harvesting forages at the proper stage of maturity.



"2 screen Shaker Box" How it works

- The main goal is to measure the distribution of feed and forage particles that the cow actually consumes + "texture & scratch"
 - Ideally 10% or more of the material should be greater than 0.75 inches (top sieve).
 - Many rations have only 3% to 8% of the TMR particles in the top sieve



"2 screen Shaker Box" How it works

- 6% to 10% of the particles in the top sieve
 - Length in top sieve: <3" long
 - Ideal length in top sieve: 1.5" long
 - Too much = sorting
- 30% to 50% in the middle sieve
 - More = Less sorting
- 40% to 60% in the bottom pan
 - High = Fast rate of passage, acidosis



"3 Screen Shaker Box" Why another screen?

- On average, 58% of the material passes through both sieves in a 2 screen set
- 3 screens provide a better analysis of smaller feed particles
- 3rd screen has a pore size of .05 inches
 - Particles smaller than this are either rapidly digested in the rumen or passed through it



"3 Screen Shaker Box" How it works

- Guidelines for high producing dairy cows
 - 2% to 8% of particles in the upper sieve (lower than the original range)
 - 30% to 50% in the middle and lower sieves
 - <20% in the bottom pan.

 Table 1. Forage and TMR particle size recommendations based on three experiments using early lactation cows fed either alfalfa haylage or corn silage with or without cottonseed hulls.

Screen	Pore Size (inches)	Particle Size (inches)	Corn Silage	Haylage	TMR
Upper Sieve	0.75	> 0.75	3 to 8	10 to 20	2 to 8
Middle Sieve	0.31	0.31 to 0.75	45 to 65	45 to 75	30 to 50
Lower Sieve	0.05 ^a	0.07 to 0.31	30 to 40	20 to 30	30 to 50
Bottom Pan		< 0.07	< 5	< 5	<u><</u> 20

^aPores are square, so largest opening is the diagonal, which is 0.07 inches. This is the reason the largest particles that can pass through the Lower Sieve are 0.07 inches in length.



Shaker Box Protocol

- Stack the (3) or (4) plastic separator boxes on top of each other in the following order: sieves with the large holes (upper sieve) on top, the smaller holes (middle sieve) in the center and the pan on the bottom.
- Place approximately 3 pints of forage or TMR in the upper sieve. On a flat surface, shake the sieves in one direction 5 times. There should be no vertical motion during shaking. This process should be repeated 7 times for a total of 8 sets or 40 shakes with the sieves rotated 1/4 turn after each set of 5 shakes. See sieve shaking pattern shown in Figure 1.





"Shaker Box" Limitations

- Very wet samples (<45% DM) may not separate accurately.
- The separator is designed to describe particle size of the feed offered to the animal
 - Moisture, molasses, etc will alter your results



Particle Length Importance

- Adequate fiber and forage particle length are necessary for proper rumen function
 - Reduced particle size decreases time spent chewing
 - Less time chewing means less saliva and therefore less natural rumen buffer
 - Match TMR PS with chewing time.
 - Variable chewing = sorting



Particle Length Importance

- When feed particles are too long, animals are more likely to sort:
 - Ultimately the diet consumed is very different than the one originally formulated
 - If rations are too fine feeding some long hay or balage could help:
 - Farms feeding 5 or more pounds of long hay per cow daily would not likely have problems with overall particle size.



Other Uses for Particle Separator

- Aid in trouble-shooting feeding, metabolic, or production problems
- Monitor feed bunk sorting
 - Measure the TMR remaining in the bunk several times throughout the day
 - (4, 8, 12, and 24 hours after feeding)
- TMR mixing consistency
 - First, middle, and last out of the TMR



Common Mistakes with Vertical Mixers

- Not allowing round or large square bales to process enough before adding other ingredients
- Leaving net wrap or twine on bales is an added detriment
- Too slow of auger RPMs Need to be at rated PTO rpm and in High for processing
- Under estimating importance of moisture level in sorting
- Mixing time- undermixing vs overmixing
- Improper knife or Hay stop adjustment



Vertical Mixer Maintenance Items

- Proper lubrication and maintenance
 - Planetary/Planetaries
- Replacing or sharpening worn knives
- Adjusting or replacing lead edge scraper
- Polishing up of tub and augers



Common Electronic Scale Issues

- Calibration
 - New machine
 - New or replacement indicator
 - Matching mixer
- Warm-up drift
- Damaged bar, load cell or cord
 - Damaged can
 - Electrical- welding
 - Pinched or chewed cord
- Mechanical
 - Check arms
 - Crooked load cell
 - Binding



Anderson Vertical TMR key features

Industry first Remote hydraulic hay stopper

= Reduced mixing time compare to the Red brand.

= Preserved structural integrity of the mix which result in better assimilation, resulting in increase of milk production up to 5%

Tri-cut Edge Auger with double sweeper

=The fastest baleage TMR mixer on the market, which work in any type of ration (corn silage, haylage, baleage)



Conclusion

- Choose the right size
- Choose the right configuration
- User the mixer properly
- Inspect and Maintain the mixer
- Choose and Manage the scale system properly
- TMR Mixer do not provide high quality feed, garbage in garbage out.
- High nutrition ration start well beyond the mixer processing!
 - Contact our representative for Baleage 101 Seminar.

