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## Designing and Managing a Feed Center for Efficiency


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The Trusted Experts In Nutrition & Health™

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## Why is this important?


- ◆ Feed costs are 50%+ of your total expenses
- ◆ The actions of the feeding operation have to be consistent and deliberate
- ◆ Those actions have a cost, are you managing or monitoring them as efficiently as possible?
  - We often consider them as the cost of doing business and not manage them with detail

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## Agenda

- ◆ Ways to maximize feeding operation efficiency
- ◆ What type feed center is best for you?
- ◆ Designs that maximize efficiency
- ◆ Don't forget the shrink
- ◆ Other things to think about
  - Safety
  - Contingency plans
- ◆ Cow performance/efficiency

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## How can you maximize efficiency?

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Dairy Cows	3,000	Fuel (\$/gallon)	\$1.85		
Pounds fed/day/cow	112	Fuel consumption tractor 4600 (gal/hr)	5		
Total feed/day	336,000	Fuel consumption tractor 3200 (gal/hr)	3.5		
Milk price (\$/cwt)	\$0.17	Fuel consumption truck (gal/hr)	7		
Average yield per year (pound)	25,000	Fuel consumption delivery truck (gallon/hr)	3		
Annual milk production	75,000,000	Electric power (\$/KWh)	\$0.09		
		Labor costs (\$/hour)	\$13.50		
Interest	4%	Average power req. mixer wagon	75%		
Insurance	1%	Average power req. stationary with vsd	60%		
		Mixer wagon	Mixer wagon	Truckmount	Stationary mixer
		Trioliet 3200	Trioliet 4600	Trioliet 3200	Solomix 3 4600 STK
		1,150 cu.ft.	1,650 cu.ft.	1,150 cu.ft.	1,650 cu.ft.
Power requirement 100% (HP)	150	200	350	300	200
Average power consumption (HP)	112.5	180	262.5	180	150
Loading time (Min)	15	17	15	17	15
Mixing time (Min)	5	5	5	5	5
Transport / discharge time (Min)	15	16	13	13	11
Loads/day	20	14	20	14	20
Hours per year for the mixer	4258	3238	4015	1874	3772
Hours per year for the delivery box				1107	
Investment					
Mixer/Stationary mixer including loading conveyor	\$110,000	\$155,000	\$120,000	\$230,000	\$184,130
Tractor/truck for mixer, 2nd hand	\$80,000	\$80,000	\$80,000		
Delivery box (truck)				\$100,000	\$100,000
Total	\$190,000	\$235,000	\$200,000	\$330,000	\$184,130
Finance and depreciation					
Mixer wagon / Stationary mixer	\$16,855	\$17,202	\$18,328	\$17,070	\$16,855
After depreciation	5%	5%	5%	5%	5%
Life time (yr / hr)	6.2	6.6	6.2	12.8	12.8
Tractor/truck for mixer	\$22,030	\$16,743	\$20,771		
After depreciation	3%	3%	3%		
Life time (hours)	20000	20000	20000		
Delivery box (truck)				\$5,536	\$5,536
After depreciation				10%	10%
Life time (hours)				18000	18000
Interest (4%)	\$3,800	\$4,700	\$4,000	\$6,800	\$3,683
Insurance (1%)	\$1,900	\$2,350	\$2,000	\$3,300	\$1,841

Annual Maintenance					
Mixer wagon / Stationary mixer	\$2,750	\$3,100	\$3,600	\$4,600	\$4,600
Percentage of investment %	2.5%	2.0%	3.0%	2.0%	2.5%
Tractor/truck for mixer	\$5,000	\$5,000	\$5,000		
Percentage of investment %					
Delivery box (truck)				\$4,000	\$4,000
Percentage of investment %				4.0%	4%
Energy (diesel / electric power)					
Tractor/truck with mixer	\$27,573	\$29,936	\$37,139		
Stationary mixer electric VSD				\$21,327	\$0
Delivery box (truck)				\$6,145	\$6,145
Labor					
Labor driver mixer wagon / loader	\$57,488	\$43,691	\$54,203	\$25,295	\$25,295
Labor delivery truck				\$14,947	\$14,947
Cost of ownership / year	\$137,395	\$122,721	\$124,289	\$108,819	\$104,231
Cost of ownership per animal / day	\$0.125	\$0.112	\$0.113	\$0.099	\$0.095
Cost of ownership per pound milk	\$0.0018	\$0.0016	\$0.0017	\$0.0015	\$0.0014
Lifetime loads	50,000 loads	50,000 loads	50,000 loads	75,000 loads	75,000 loads
Ration density	24.34 lbs. cu.ft.				

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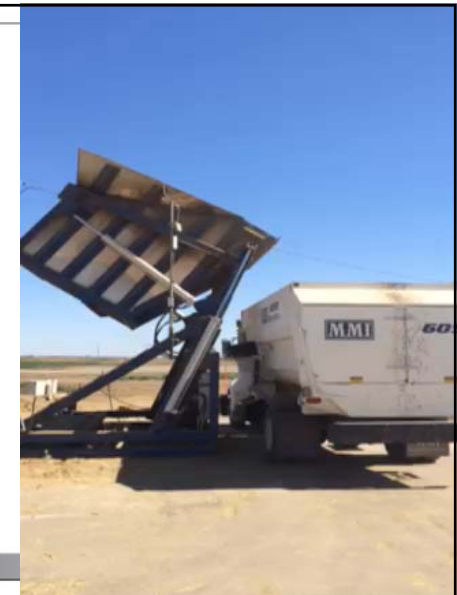
### Ways to Gain Efficiency

- ◆ Have all ingredients in the feed center when making loads (make loads in 8 - 10 minutes)
- ◆ Use stationary mixers and delivery boxes when distance or high volume is present
- ◆ Have loading area lower than loader travel area (less loader cycle time)
- ◆ Make on farm premixes (reduce amount of ingredients per load)
- ◆ Staging loads will increase feeding efficiency



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Side dump  
weigh hopper  
will allow  
loads to be  
staged



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## Ways to Gain Efficiency

- ◆ Size your mixer to match your needs (bigger is not always better)
- ◆ Mix and deliver full loads when possible (this reduces number of trips for loader and mixer)
- ◆ Use your feeding software to it fullest (not just to make loads)
- ◆ Size your loader bucket to best address your operation



### On-farm Premix Deviation Calculator

Predicted Average Deviation	30	Total Daily Savings Using Premix	\$531.14
TMR Load Size (lbs)	24000	Yearly Savings Using Premix	\$193,867.01
Premix Load Size (lbs)	36000		
Number of TMR loads per day	20		
Number of Premix Loads per day	4.9		

Ingredient	Formulation Amount (lbs)	Formulation %	Premix Ingredients %
Corn Silage	50.30	54.9%	-----
Alfa Hay	8.25	9.0%	-----
Steam-flaked Corn	11.76	12.8%	35.6%
Canola	6.67	7.3%	20.2%
DDG	3.30	3.6%	10.0%
Cotton Seed	4.95	5.4%	15.0%
Beet Pulp	3.30	3.6%	10.0%
Mineral	1.73	1.9%	5.2%
Molassess	1.30	1.4%	3.9%
	91.56		100%

### Premix Deviation Cost

Ingredient	Formulation Amount (lbs)	Batch Amount (lbs)	Loading Deviation (lbs)	Ingredient Cost (ton)	Total Cost	Cost of Deviation	Total Deviation Cost per Day
Steam-flaked Corn	11.76	12830	30	\$296.00	\$1,898.84	\$4.44	
Canola	6.67	7270	30	\$385.00	\$1,399.48	\$5.78	
DDG	3.30	3600	30	\$344.00	\$619.20	\$5.16	
Cotton Seed	4.95	5400	30	\$355.00	\$958.50	\$5.33	
Beet Pulp	3.30	3600	30	\$180.00	\$324.00	\$2.70	
Mineral	1.73	1890	30	\$550.00	\$519.75	\$8.25	
Molassess	1.30	1420	30	\$235.00	\$166.85	\$3.53	
	33.01	36010			\$5,886.62	\$35.18	\$172.36

### TMR (50lb/hd) Deviation Cost for Ingredients in Premix

Ingredient	Formulation Amount (lbs)	TMR Amount (lbs)	Loading Deviation (lbs)	Ingredient Cost (ton)	Total Cost	Cost of Deviation	Total Deviation Cost per Day
Steam-flaked Corn	11.76	3080	30	\$296.00	\$455.84	\$4.44	
Canola	6.67	1750	30	\$385.00	\$336.88	\$5.78	
DDG	3.30	870	30	\$344.00	\$149.64	\$5.16	
Cotton Seed	4.95	1300	30	\$355.00	\$230.75	\$5.33	
Beet Pulp	3.30	870	30	\$180.00	\$78.30	\$2.70	
Mineral	1.73	450	30	\$550.00	\$123.75	\$8.25	
Molassess	1.30	340	30	\$235.00	\$39.95	\$3.53	
	33.01	8660			\$1,415.11	\$35.18	\$703.50

### Total Cost per Ton: Loading, Mixing & Delivering TMR

26 Dairy Farms, Sorted by Total Cost per Ton Fed

2014-2015

	Average	Percent of Total	1st Quartile	2nd Quartile	3rd Quartile	4th Quartile
Tons Fed per Day	88.4		153.0	64.6	82.6	36.0
Labor	\$2.34	44.0%	\$1.27	\$1.86	\$2.30	\$4.14
Fuel & Utilities	\$0.99	19.2%	\$0.62	\$0.80	\$1.09	\$1.49
Repairs	\$0.57	11.1%	\$0.41	\$0.56	\$0.45	\$0.89
<b>Total Operating Expense</b>	<b>\$3.90</b>	<b>74.3%</b>	<b>\$2.30</b>	<b>\$3.22</b>	<b>\$3.83</b>	<b>\$6.52</b>
Deprecation	\$0.8	16.3%	\$0.51	\$0.84	\$0.96	\$0.97
Interest	\$0.4	8.7%	\$0.33	\$0.41	\$0.48	\$0.57
Insurance	\$0.0	0.7%	\$0.02	\$0.02	\$0.04	\$0.09
<b>Total Ownership Expense</b>	<b>\$1.30</b>	<b>25.7%</b>	<b>\$0.85</b>	<b>\$1.26</b>	<b>\$1.48</b>	<b>\$1.64</b>
<b>Total Cost, Loading, Mixing &amp; Delivering TMR, Per Ton</b>	<b>\$5.20</b>	<b>100%</b>	<b>\$3.15</b>	<b>\$4.48</b>	<b>\$5.31</b>	<b>\$8.16</b>

Annual cost range for 500 cows eating 110 lbs. as fed is \$31,618.00 to \$81,906.00 for a variation opportunity of \$50,288.00

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**Total Cost per Ton: Loading, Mixing & Delivering TMR**

26 Dairy Farms, Sorted by Total Cost per Ton Fed

2014-2015

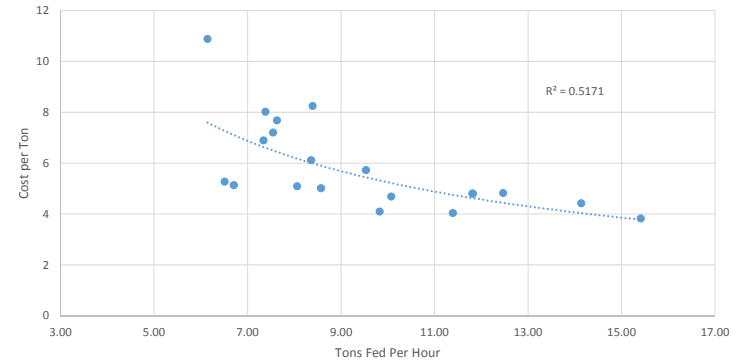
	Average	Percent of Total	1st Quartile	2nd Quartile	3rd Quartile	4th Quartile
Tons Fed per Day	88.4		153.0	64.6	82.6	36.0
<b>Summary Statistics</b>						
Tons Fed per Labor Hour	8.30		12.07	8.64	7.54	4.46
Loads per Labor Hour	1.31		1.21	1.47	1.58	0.93
Cows Fed per Labor Hour	119.1		152.5	125.9	113.4	80.0
Total Cost Per Labor Hour	\$37.81		\$37.52	\$38.30	\$39.92	\$35.19
Fuel per Load, Gallons	2.9		3.2	2.4	2.2	3.8
Fuel per Ton, Gallons	0.45		0.31	0.39	0.39	0.73
Average Load Size, Tons	6.99		10.49	6.22	5.86	5.01
% Of Mixer Capacity	65%		77%	68%	60%	56%
Cost per Worker Equivalent	\$44,623		\$41,594	\$42,247	\$47,921	\$46,685
Calculated Length of Feeding, 1 Person, Hours	10.24		13.11	8.14	10.56	8.63
Time per Load, Minutes	44.62		43.21	35.07	39.07	62.30
Cost per Gallon, Fuel	\$2.06		\$2.02	\$2.05	\$2.13	\$2.02
Loader Size, Average, Yards	3.77		4.73	3.81	3.79	2.58
Investment per Ton Fed						
Truck/Tractor & Mixer	\$5.35		\$4.55	\$4.76	\$5.02	\$7.24
Loader	\$4.40		\$2.59	\$4.65	\$5.78	\$4.68

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**Tons Fed per Labor Hour vs Cost per Ton Fed**  
26 Dairy Farms, 2014 - 2015

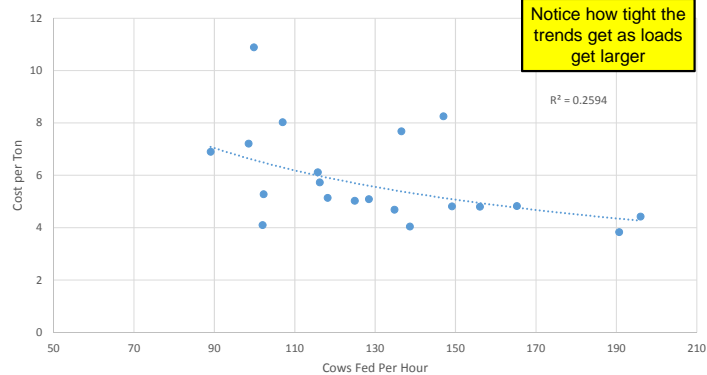


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**Cows Fed per Labor Hour vs Cost per Ton Fed**  
26 Dairy Farms, 2014 - 2015

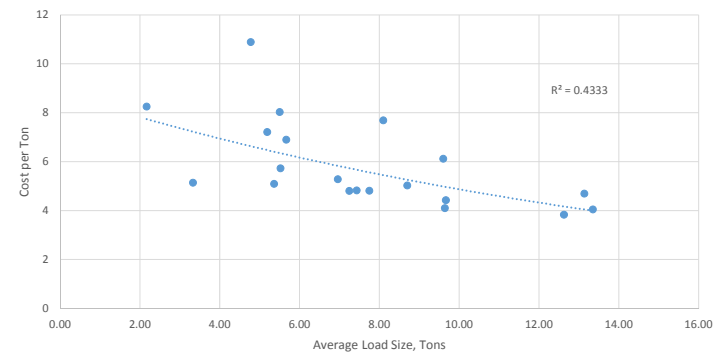


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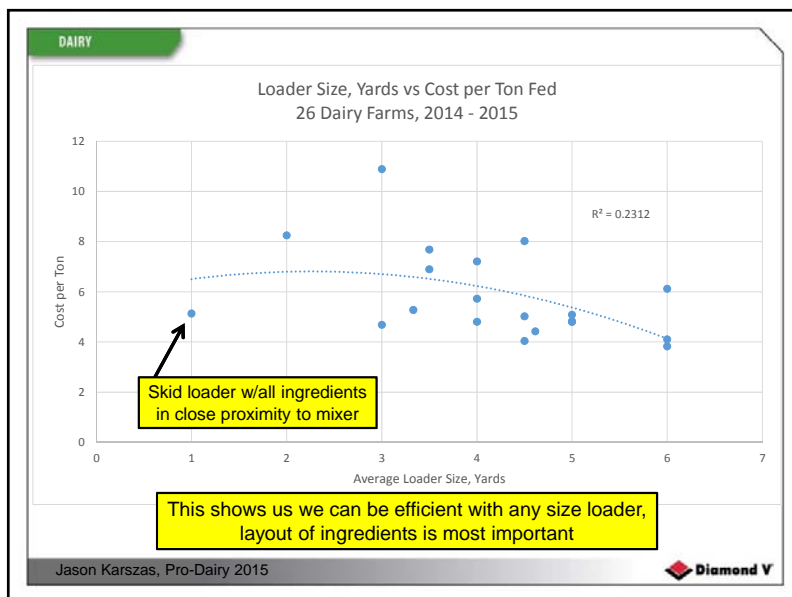
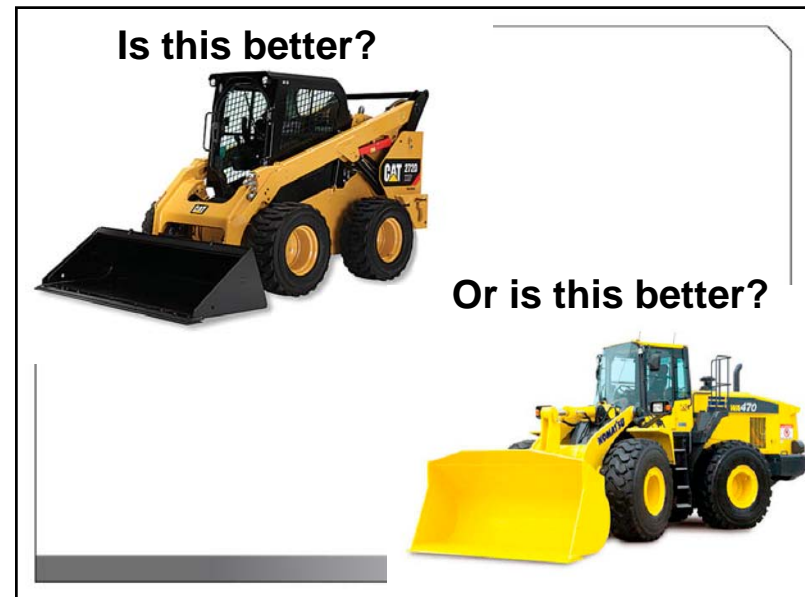
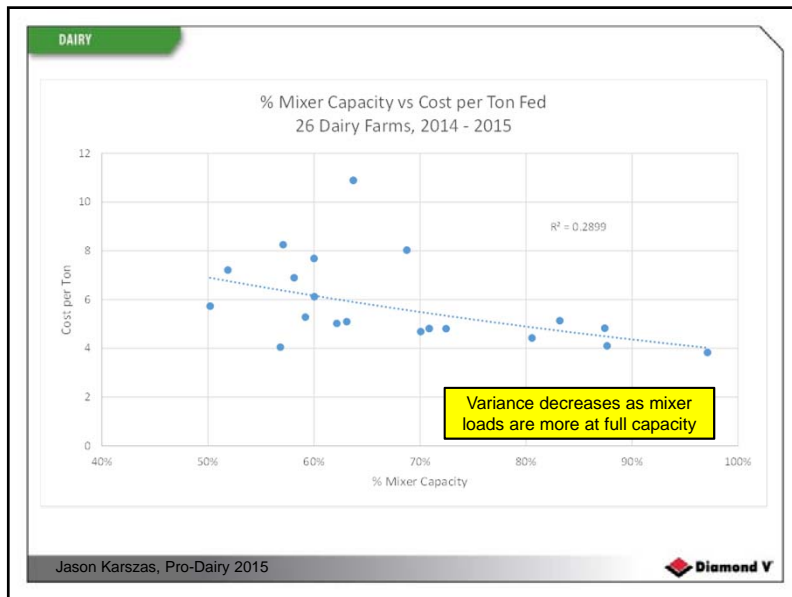
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**Average Load Size, Tons vs Cost per Ton Fed**  
26 Dairy Farms, 2014 - 2015



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## Take Away Message

- ◆ Size your mixer and feeding equipment properly for your operation
- ◆ Track these key numbers to maximize your efficiency
- ◆ As loads get larger, there seems to be more efficiency realized
- ◆ Loader bucket size may not be as important as the proximity of ingredients to mixer (layout and design can save \$\$)

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## Take Away Message

- ◆ There is a lot of room for opportunity to maximize efficiency in the actions around feeding our herds if we measure and monitor it.

## What type feed center?

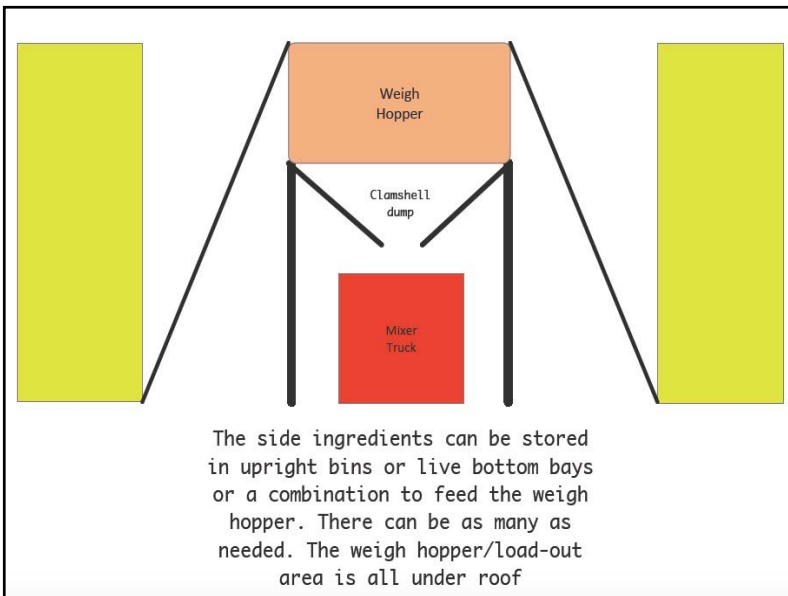
- ◆ An automated system?
- ◆ Minimal mechanization?
- ◆ A combination?

What type works for your operation and your management style?

## Key Things to Remember

- ◆ Always keep off farm traffic separate from on farm mixing traffic
- ◆ Have a platform truck scale system in place
- ◆ Adequately size the bays, not too big or too small
- ◆ Always have one to two “flex bays”
- ◆ Be able to unload from various delivery truck types

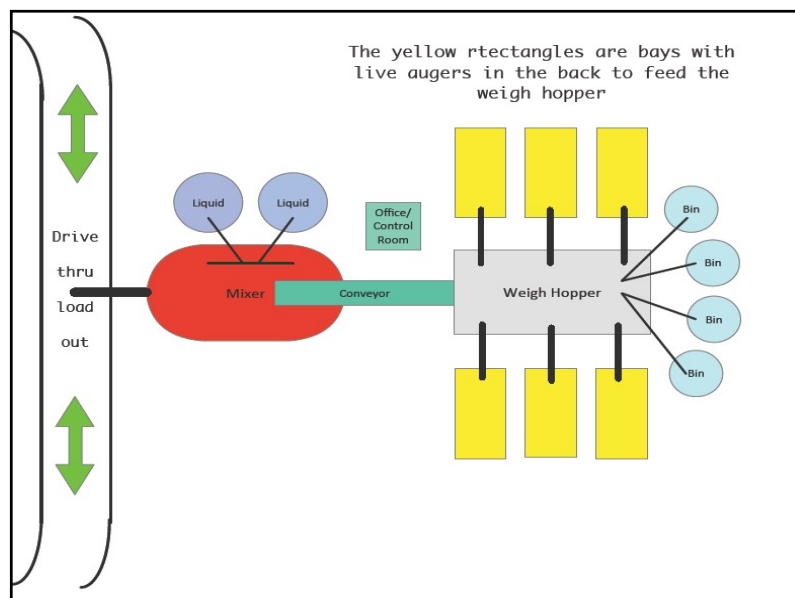
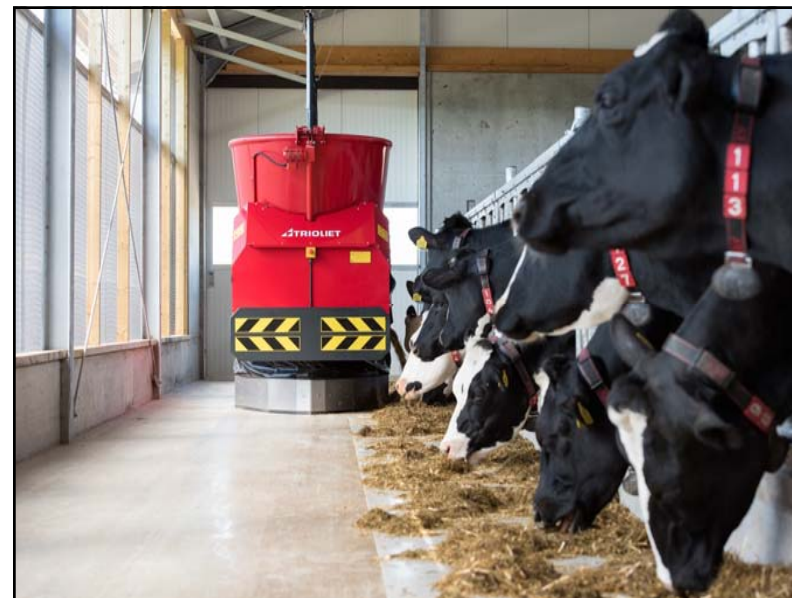
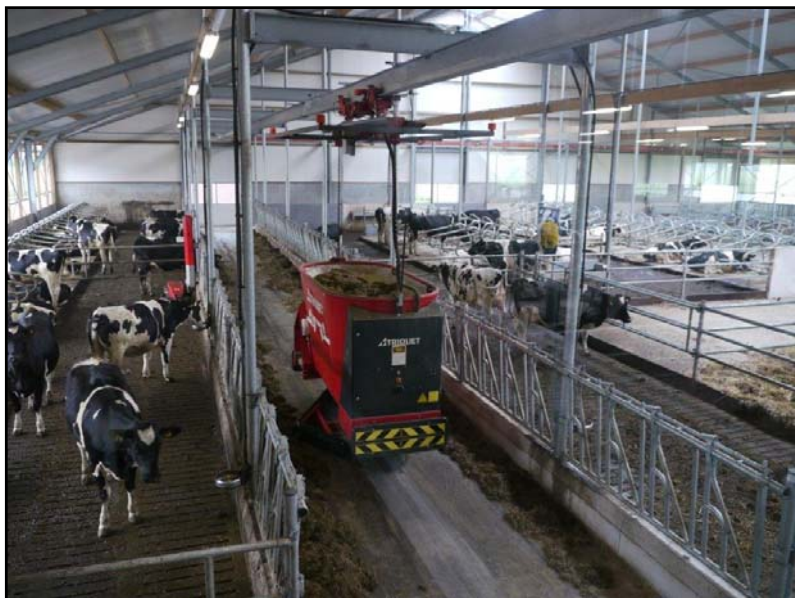






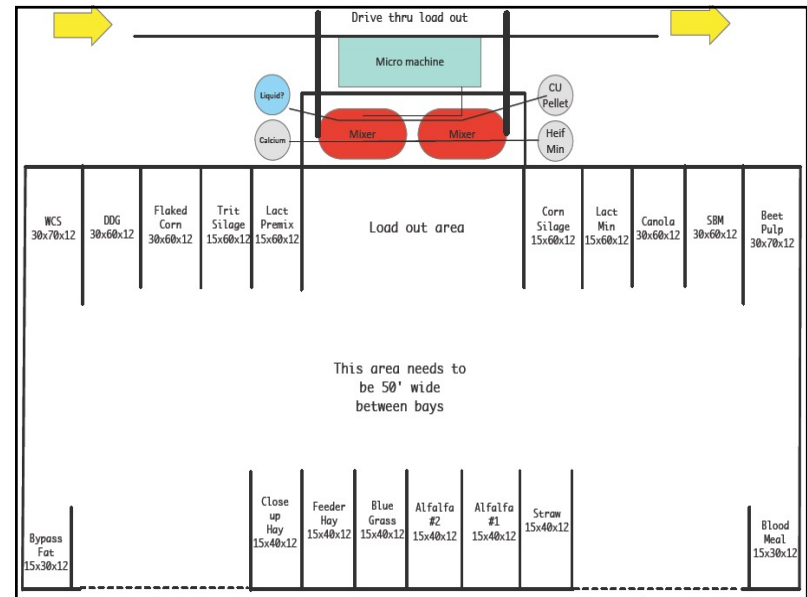
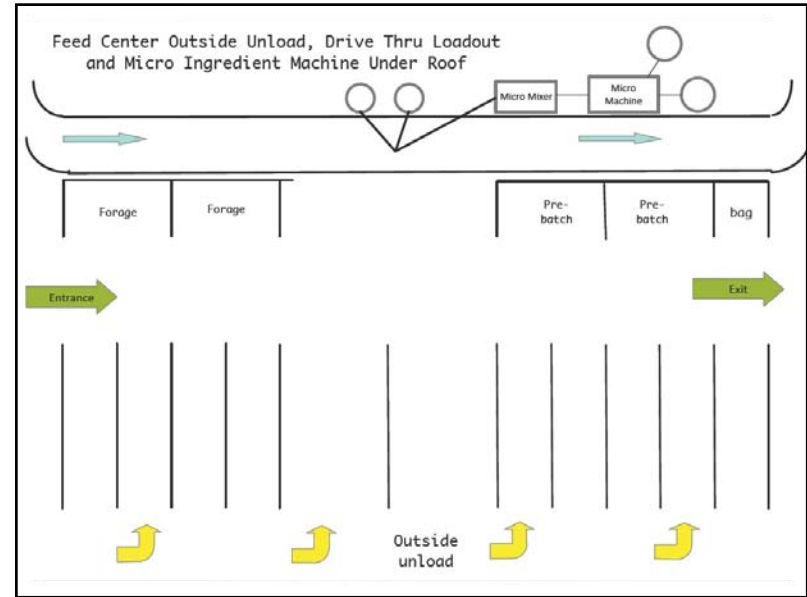


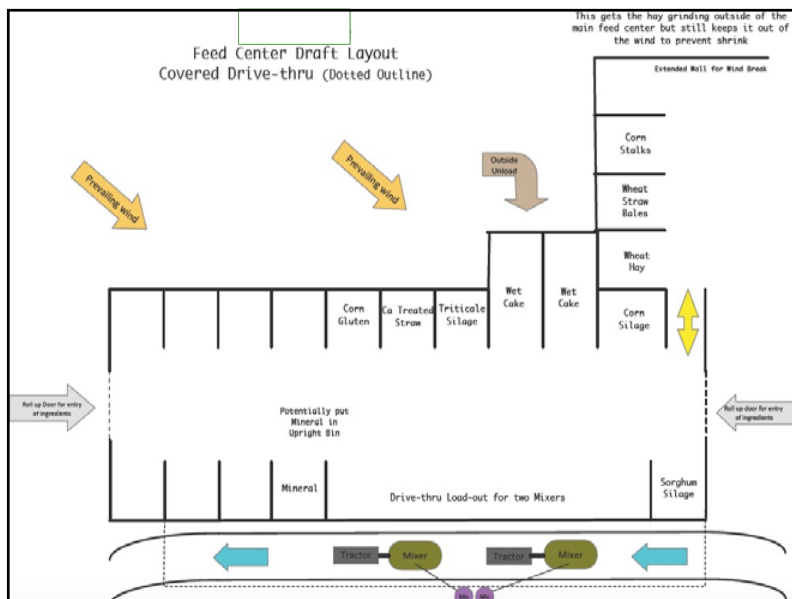
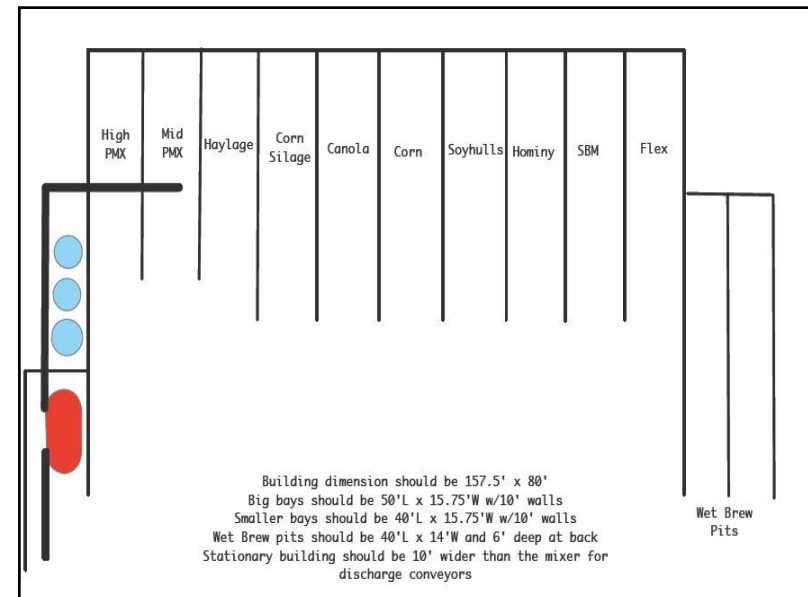
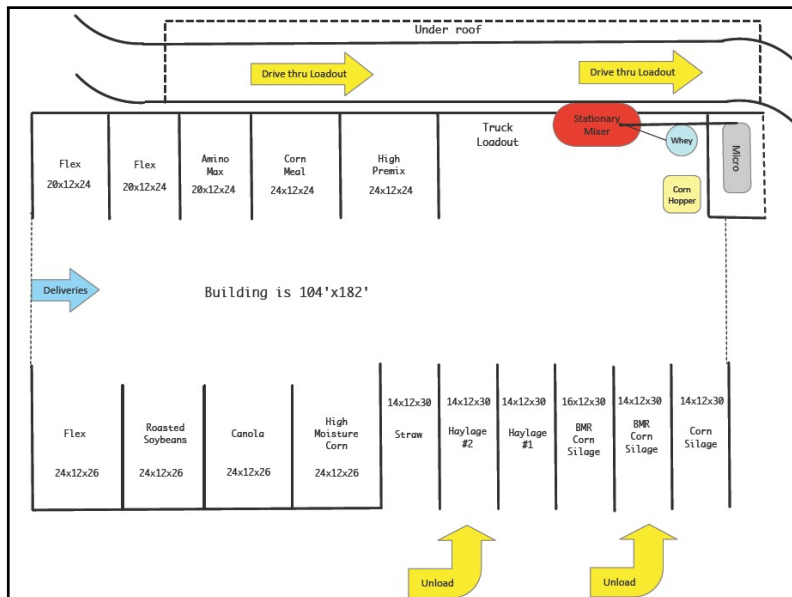




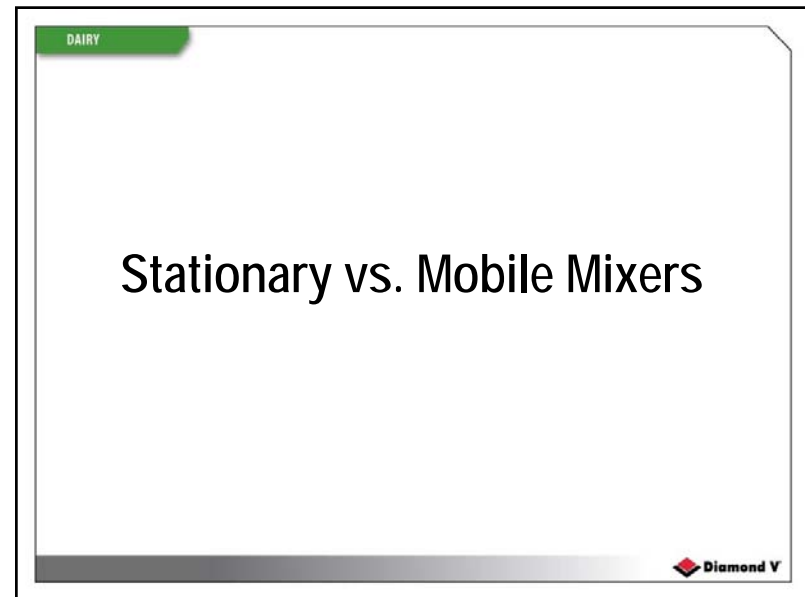
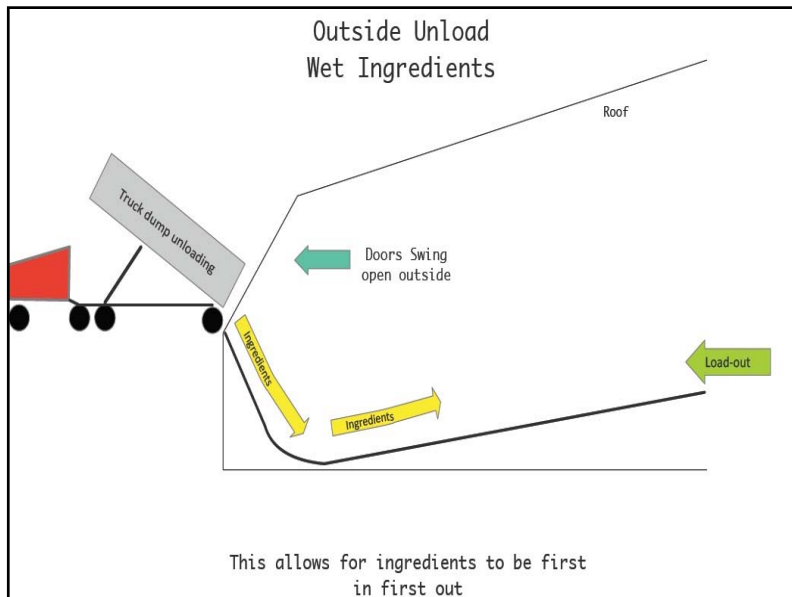












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## Stationary Mixers

- ◆ More efficient when further distances have to be covered and sometimes in close proximity
- ◆ Allow for better consistency as one employee does mixing
- ◆ Allows for feed to be delivered in a lighter more efficient piece of equipment
- ◆ Mixers will have a better longevity because of no harsh travel
- ◆ Have to have a transfer system to a delivery truck
- ◆ What is your Plan B when something breaks

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