Fact sheet

U.S. Dairy Forage Research Center
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Abating ammonia emissions from dairy barns and fields

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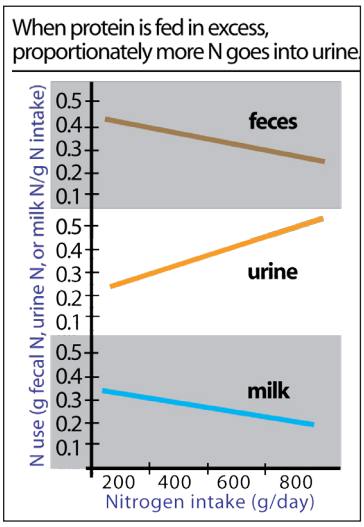
Dairy barns are thought to emit large amounts of ammonia. The nitrogen contained in cow urine is the major source of ammonia nitrogen.

Only approximately 20 to 35% of the nitrogen (crude protein) fed to dairy cows is converted into milk. The rest is excreted in manure (feces and urine).

Feeding nitrogen (crude protein) to dairy cows in excess of their requirements decreases the relative amount of feed nitrogen converted into milk and increases urine nitrogen excretion.

After land application, ammonia loss is less when the manure comes from cows fed a CP-adequate diet (13.6%) rather than a CP-excessive diet (19.4%).



Percent of applied nitrogen that's volatized		
Diet crude protein level	Liquid manure type	
	Fresh	Stored
13.6%	31%	12%
19.4%	68%	29%

Abating ammonia emissions

Losses of nitrogen as ammonia gas are inevitable, but ammonia loss can be reduced through good management.

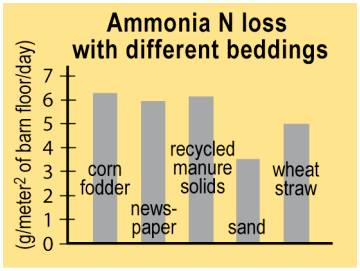
1. Put more N into milk, not manure

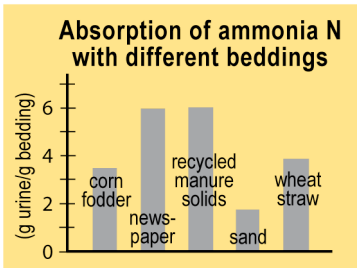
One of the most reliable approaches to reducing ammonia emissions per unit of milk produced is to increase the level of milk production per cow. On 54 Wisconsin dairy farms, milk production and feed nitrogen use efficiency are highest on farms that: (1) use total mixed rations, (2) balance rations at least four times per year, and (3) milk three times a day.

2. Consider how bedding affects ammonia N loss

Sand is the least urine absorbent bedding and recycled manure solids are the most. BUT ammonia emissions are lower from sand than from other beddings.

Three ways to reduce ammonia emissions





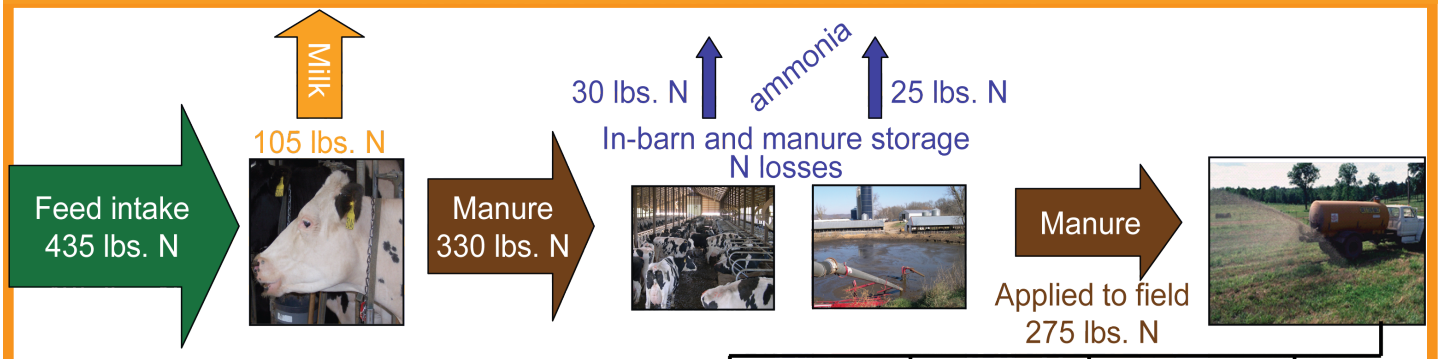
1. Remove excess protein from the cow's diet. This normally saves on feed cost, as well as reducing ammonia nitrogen loss.
2. For new construction, floors that divert urine away from feces can reduce ammonia emissions. Slatted floors facilitate this.
3. Select bedding (e.g., sand, pine shavings) that separate feces and urine, which reduces ammonia losses.

These three strategies could potentially reduce in-barn ammonia nitrogen loss from the current level of 10-15 kg/cow/yr to 4-8 kg/cow/yr – a 50 to 60% reduction!

Percent feed nitrogen converted into milk as related to various practices on 54 Wis. dairy farms.			
Practice	Use practice?	Daily milk production (lbs./cow)	Feed nitrogen use (%)
Use TMR	yes	74	27
	no	57	24
Balance rations 4x/yr	yes	67	26
	no	54	21
Milk 3x/day	yes	88	33
	no	63	25
Use BST	yes	82	29
	no	61	25

From feed to field: Nitrogen flow on a typical confinement dairy operation

(pounds nitrogen/cow/year)



Impact of manure application on nitrogen cycling	Knifing in	Injecting in open slots	Band spreading	Broadcasting
Ammonia N loss	5	15	24	70
N going to soil	270	260	251	205

References

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