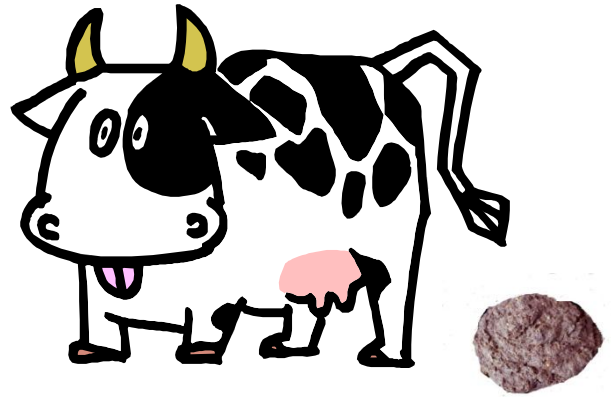


Diet Factors Affecting Ammonia Production From Dairy Cow Manure



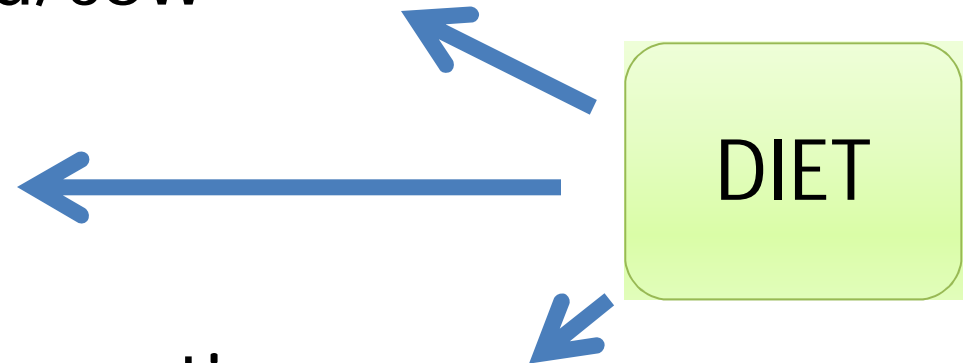
OARDC
EXTENSION

Bill Weiss
Dept of Animal Sciences
The Ohio State University
Wooster

Macro-Factors



1. Amount of N excreted/cow
2. Number of cows
3. Route (or form) of N excretion
4. Manure storing/handling system



To provide 5.6 billion lbs of milk protein (US consumption in 2010)

Lbs. Milk/Cow

20,000

9.8 mil cows
+ 7.5 mil heifers/dry cows

25,000

7.9 mil cows
+ 6.1 mil heifers/dry cows

30,000

6.6 mil cows
+ 5.1 mil heifers/dry cows

5.6 mil fewer
animals

To provide 5.6 billion lbs of milk protein (US consumption in 2010)

Lbs. Mil

20,000

25,000

30,000

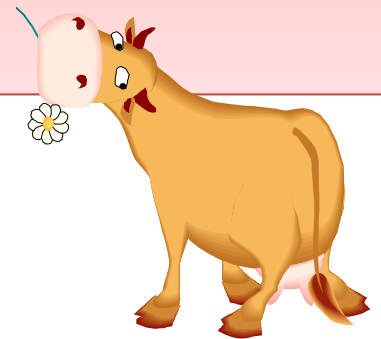
Managing cows for high production = greatest effect on environmental impact of dairy farming

+ 6.1 mil heifers/dry cows

6.6 mil cows

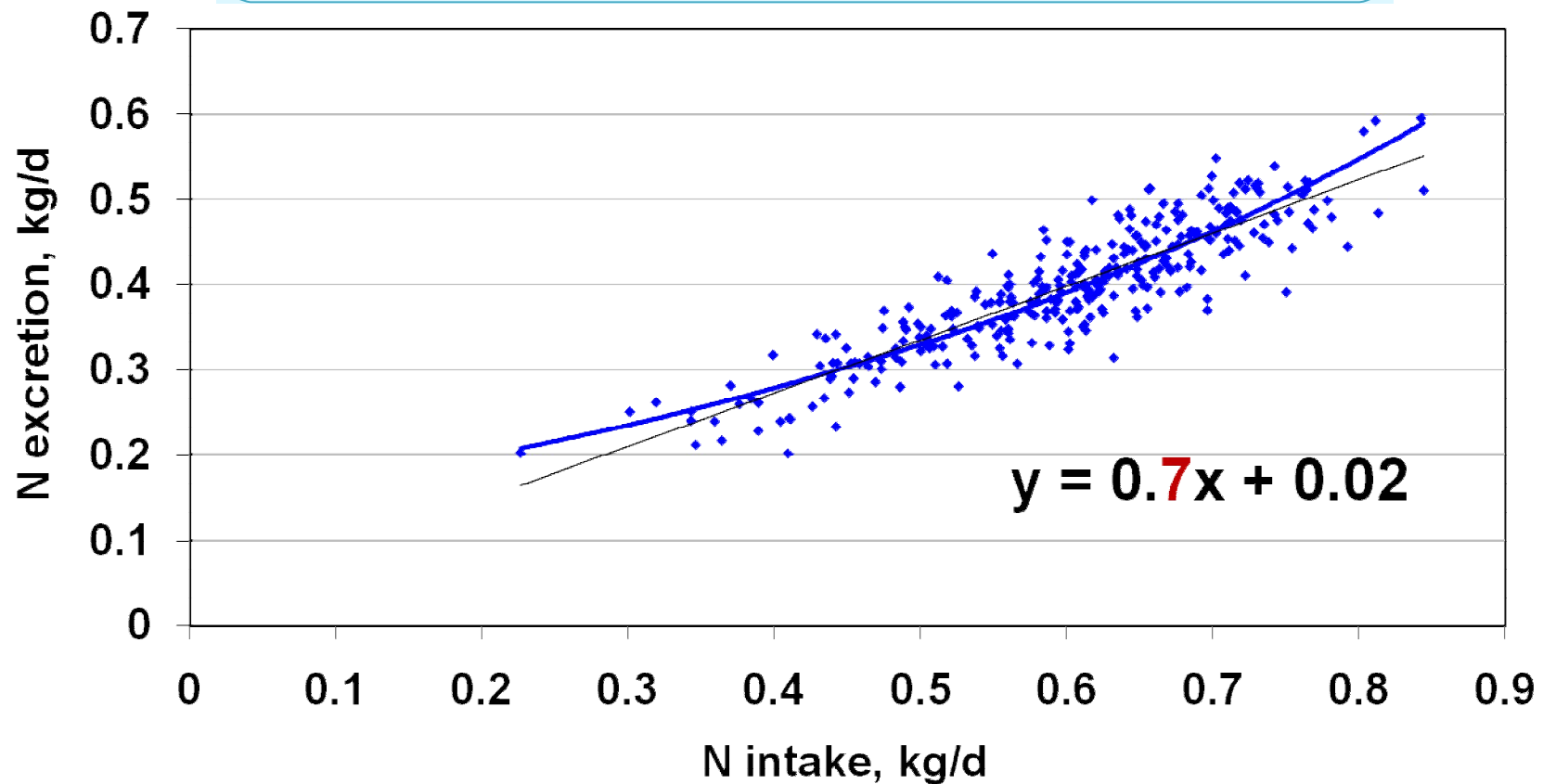
+ 5.1 mil heifers/dry cows

5.6 mil fewer animals

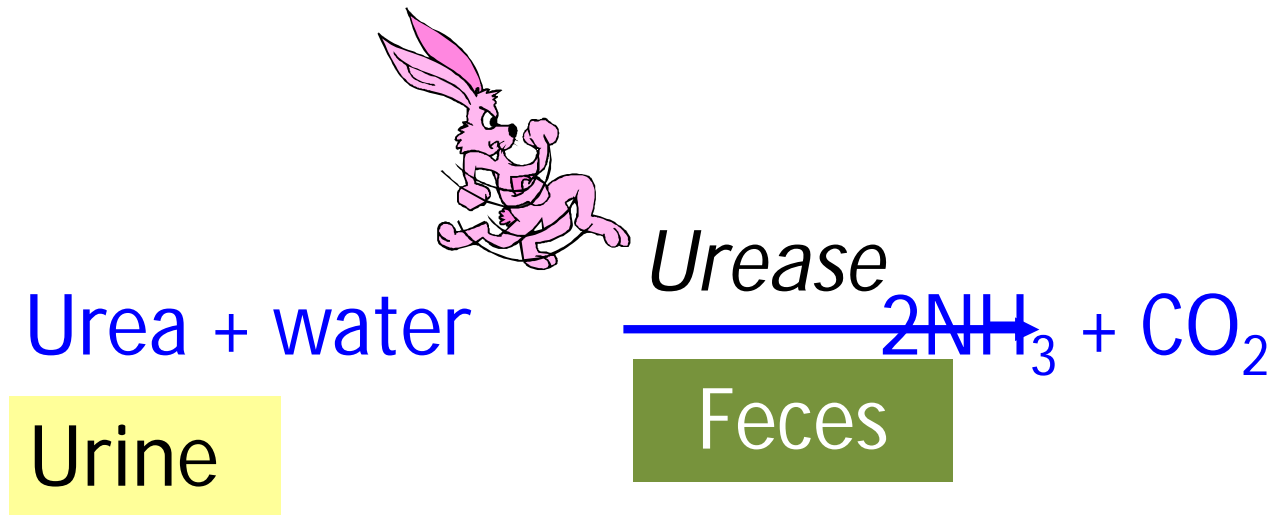


N intake and Excretion

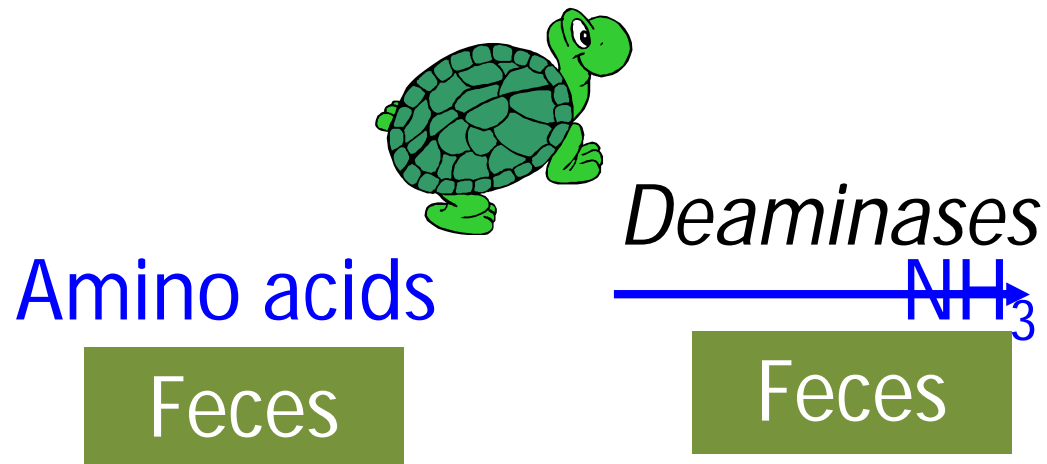
Cows that eat more N (protein)
excrete more N



Sources of Manure Ammonia



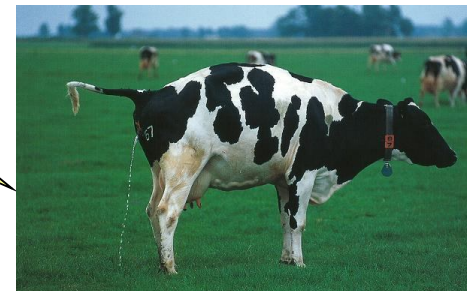
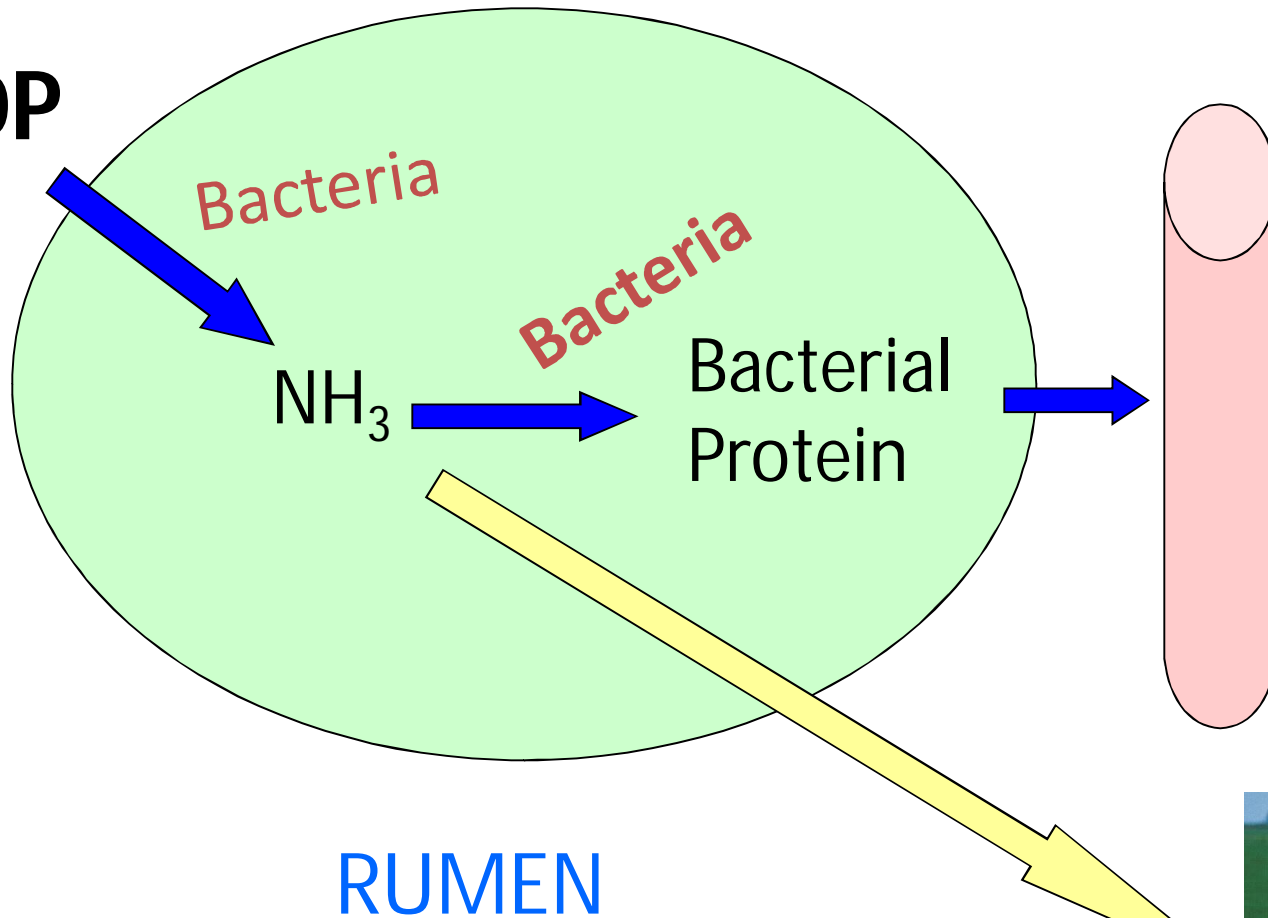
Hours-
days



Days-
weeks

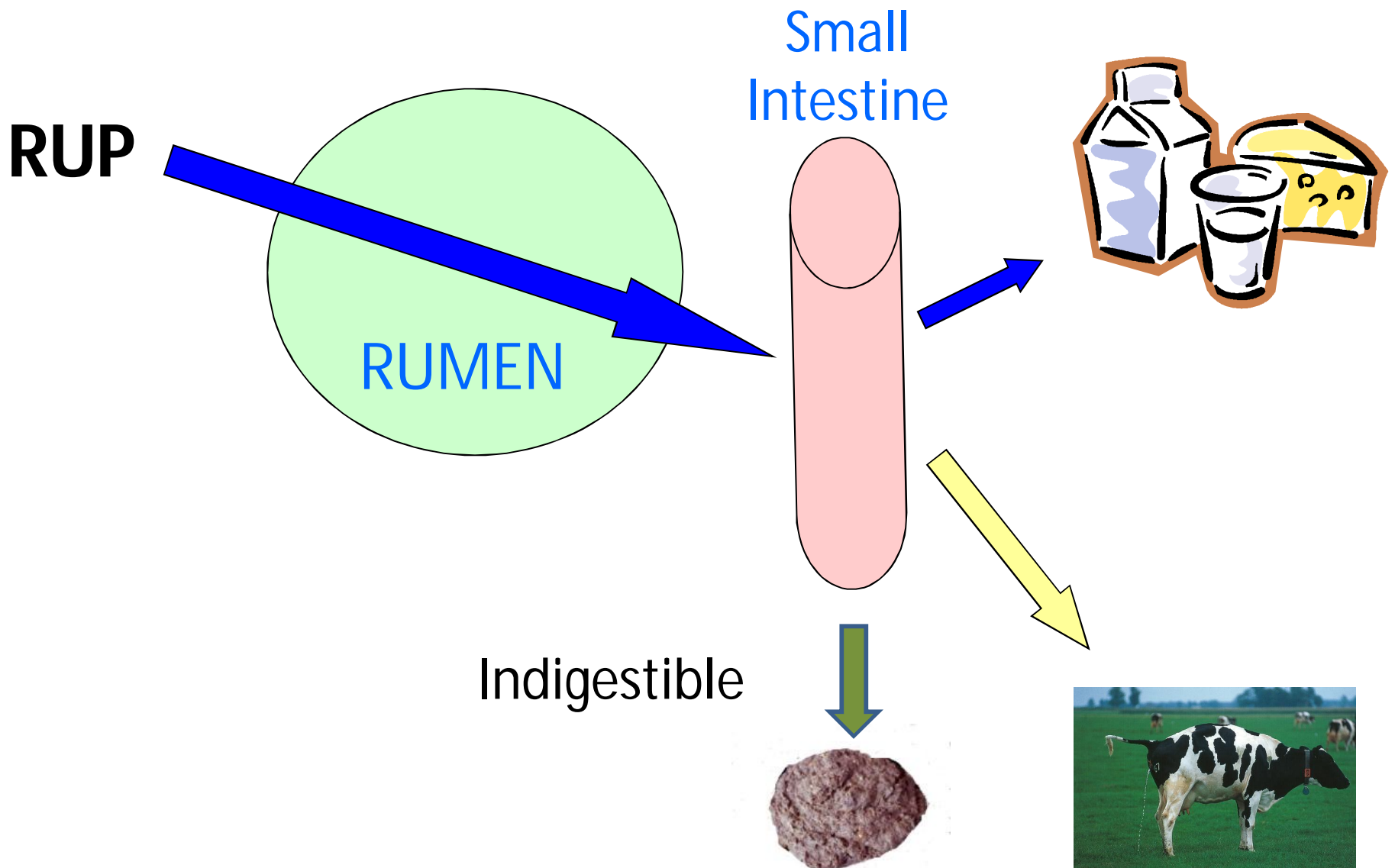
Urea, alfalfa, soybean meal

RDP



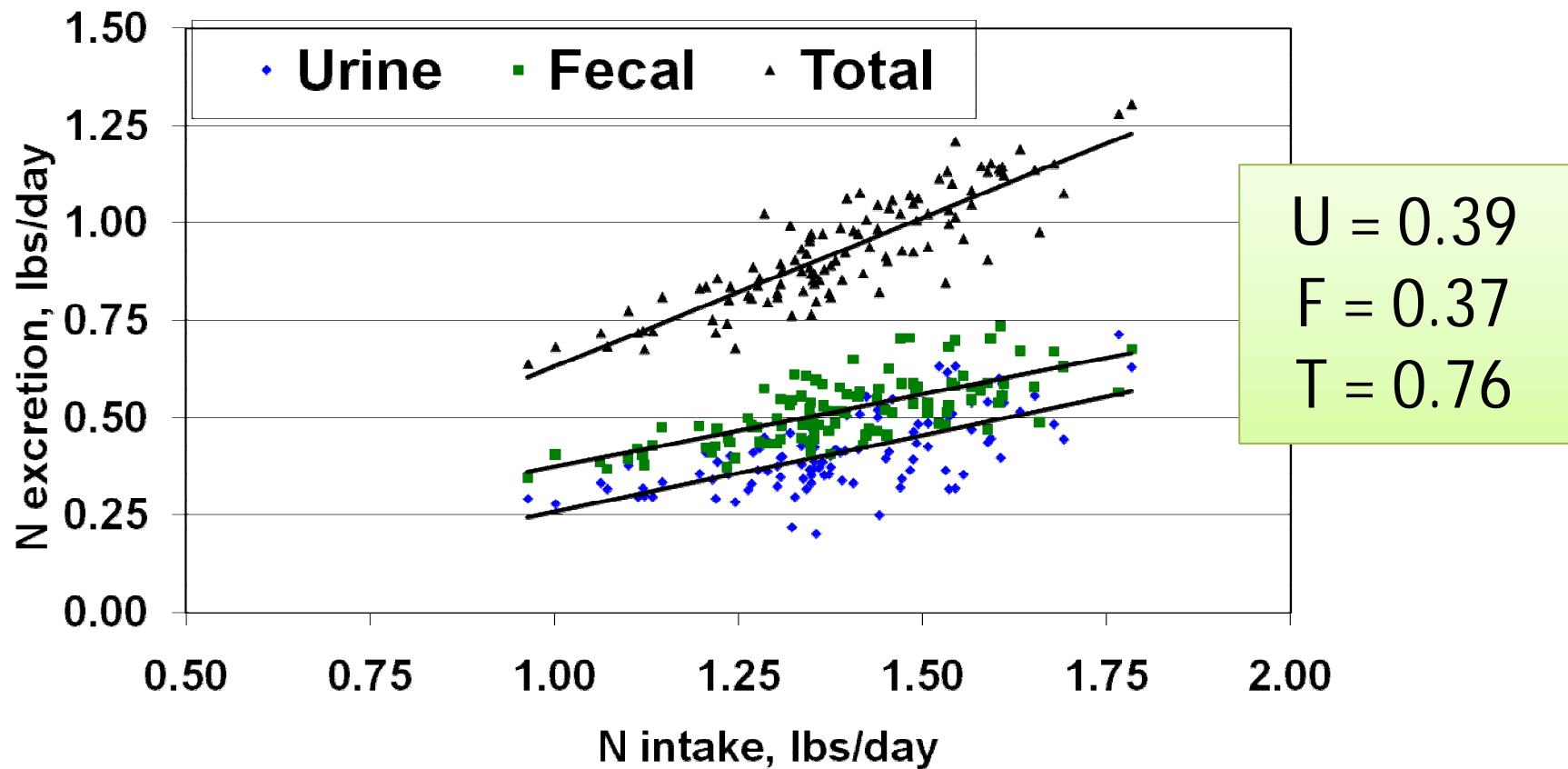
Rumen **D**egradable **P**rotein

Distillers, heated soy, gluten meal

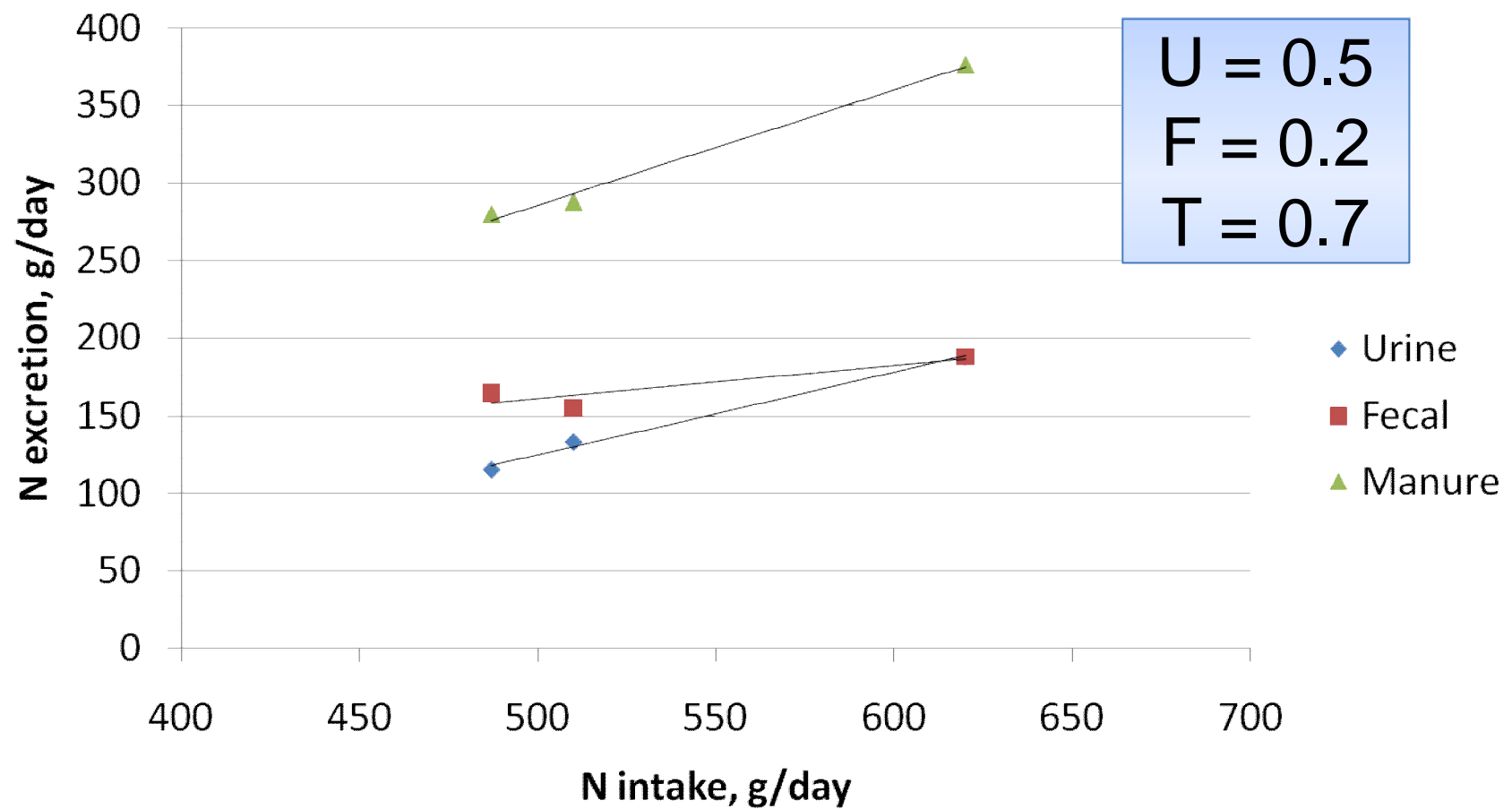


Rumen **U**ndegradable **P**rotein

N intake and Excretion when RDP Constant



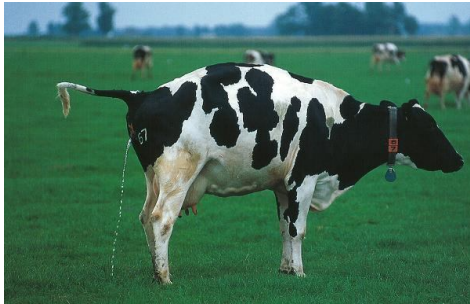
Weiss et al., 2009



Agle et al., 2010



Urine N



RDP



Digestible RUP



Imbalance of digest. RUP-AA



Easily fermented Carbs



Fecal N



Heat-damaged forages



Distillers grains



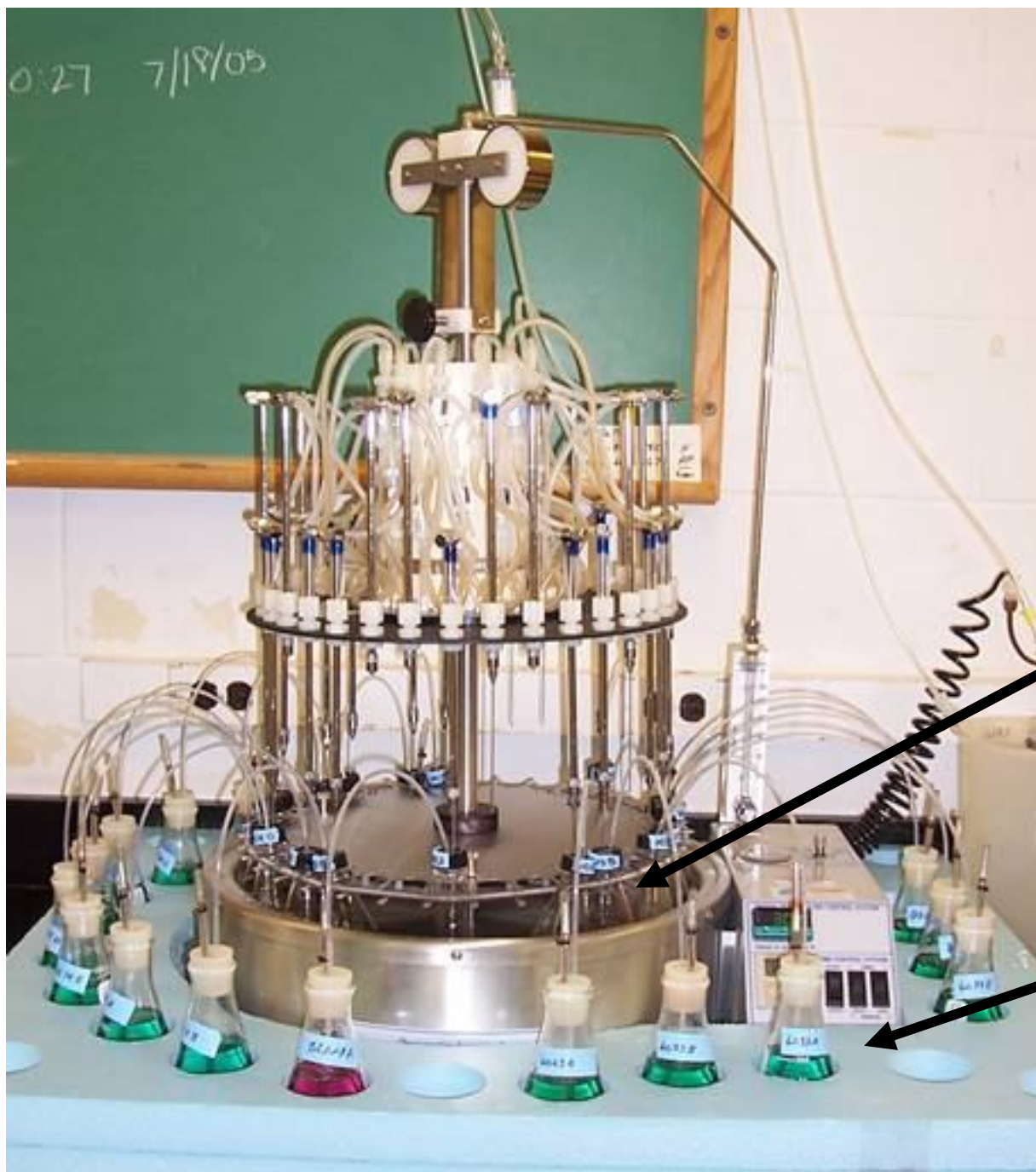
Hay-crop (



oilseed meals)



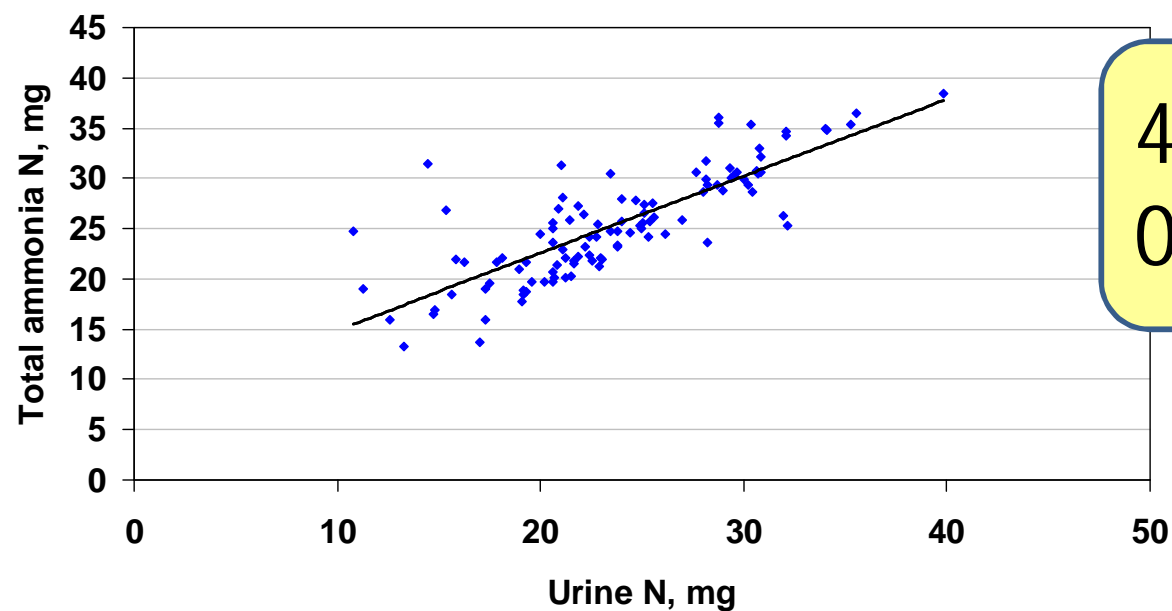
Slowly fermented carbs



Ammonia
Emissions

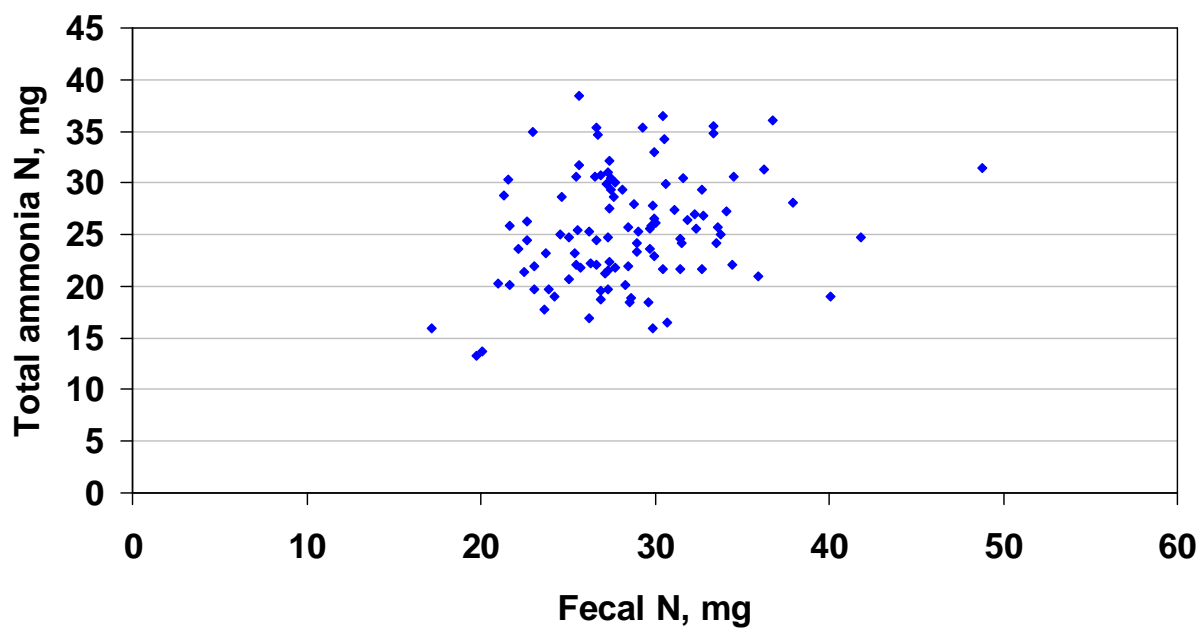
Manure Slurry

Boric Acid

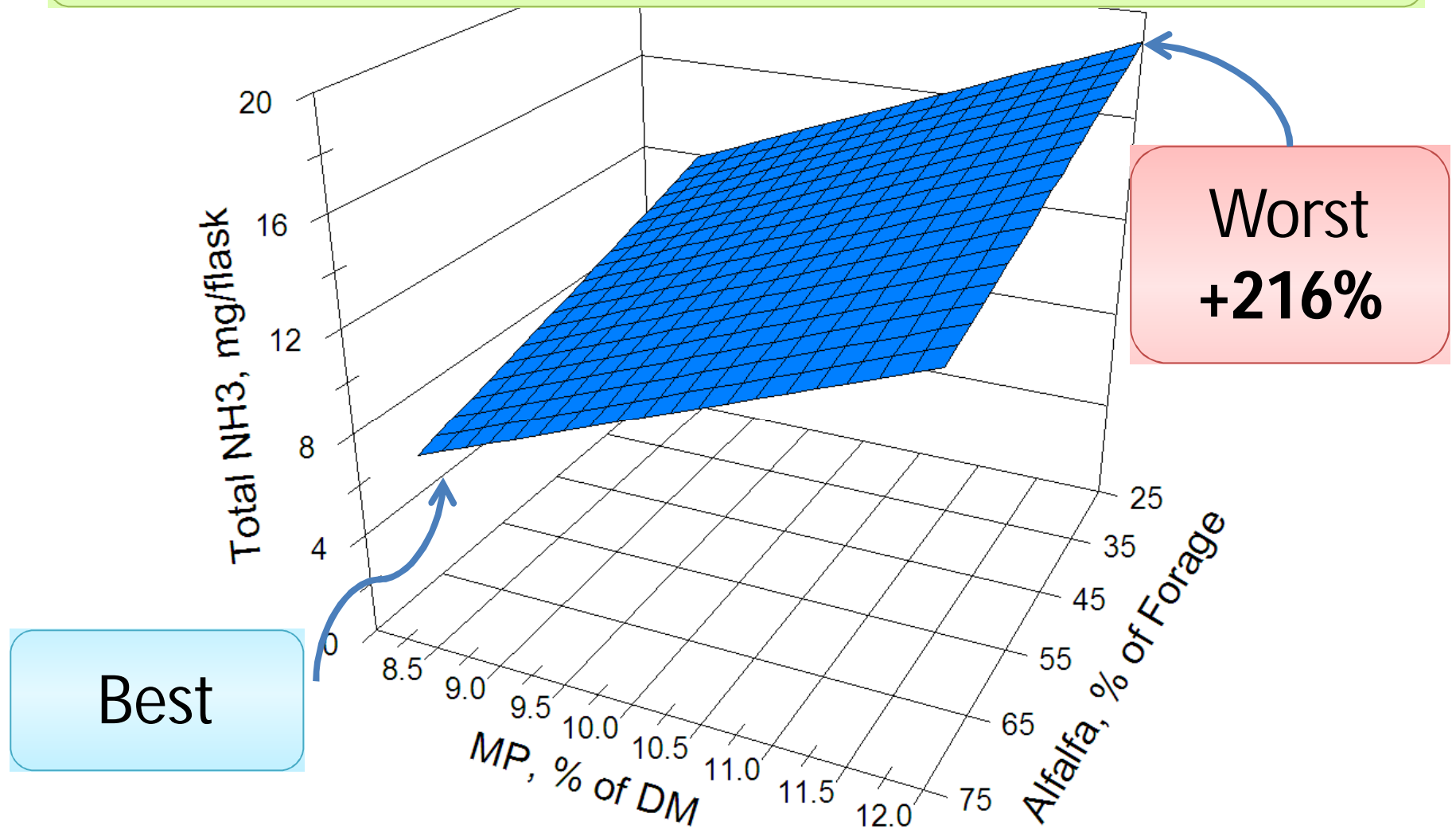


48 hr NH₃-N =
 $0.77 * \text{Urine N}$

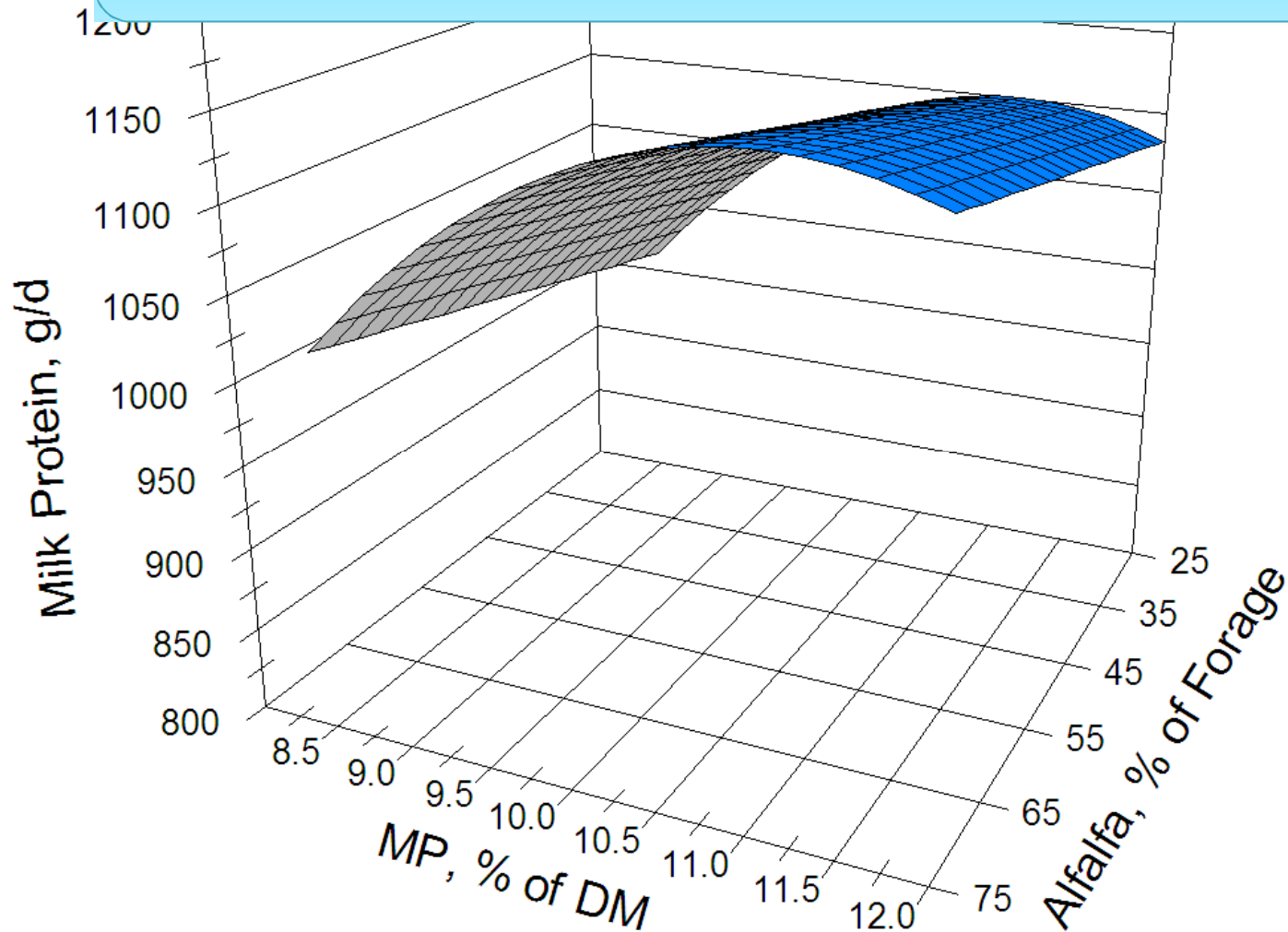
48 hr NH₃
Not related
to fecal N



NH₃ Production per unit of manure



Maximum Milk Protein: 75% alfalfa
with 11.1% MP

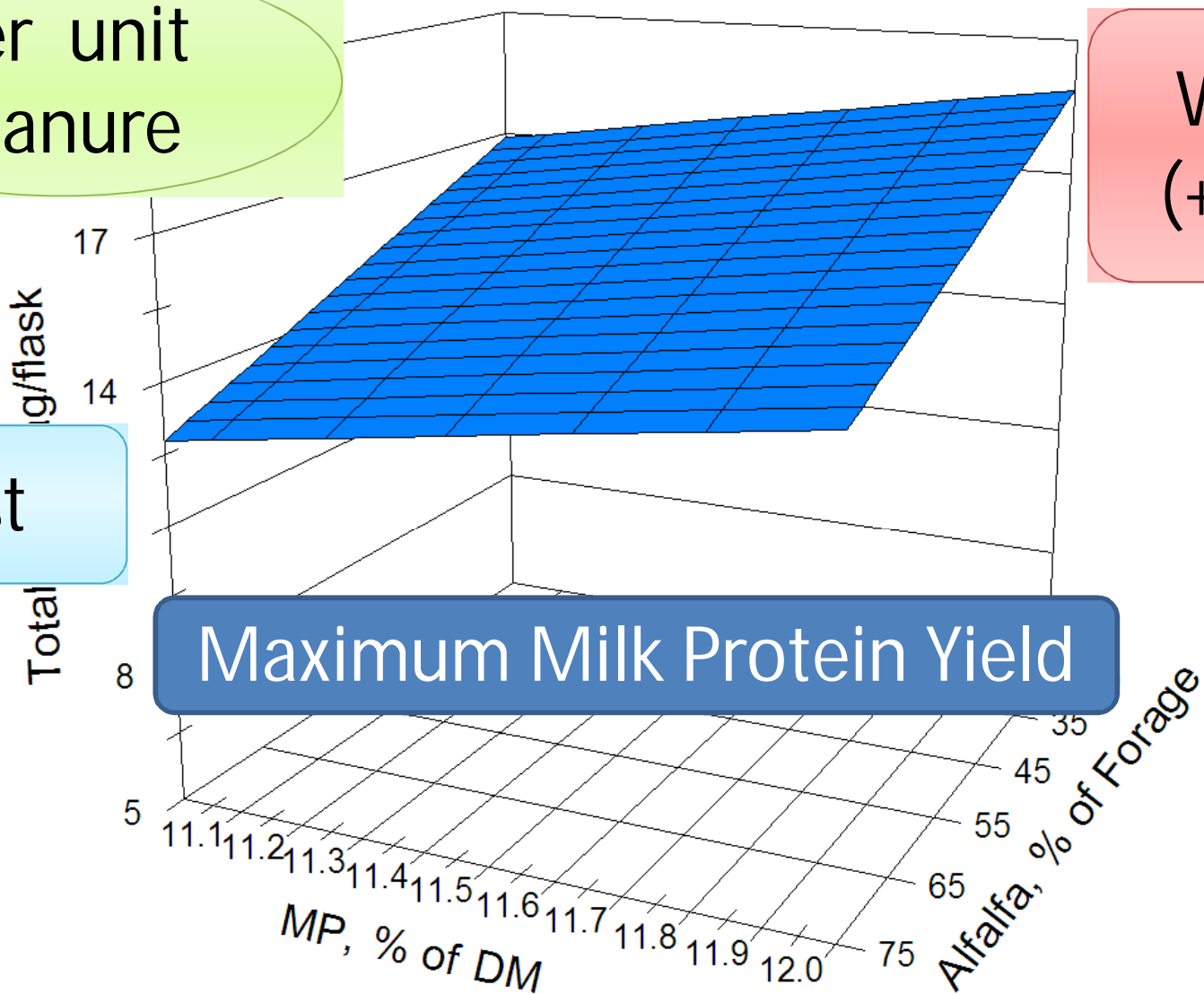


Per unit
manure

Worst
(+52%)

Best

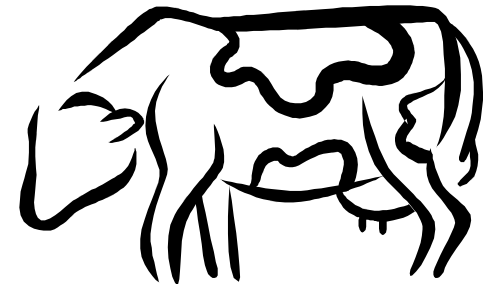
Maximum Milk Protein Yield



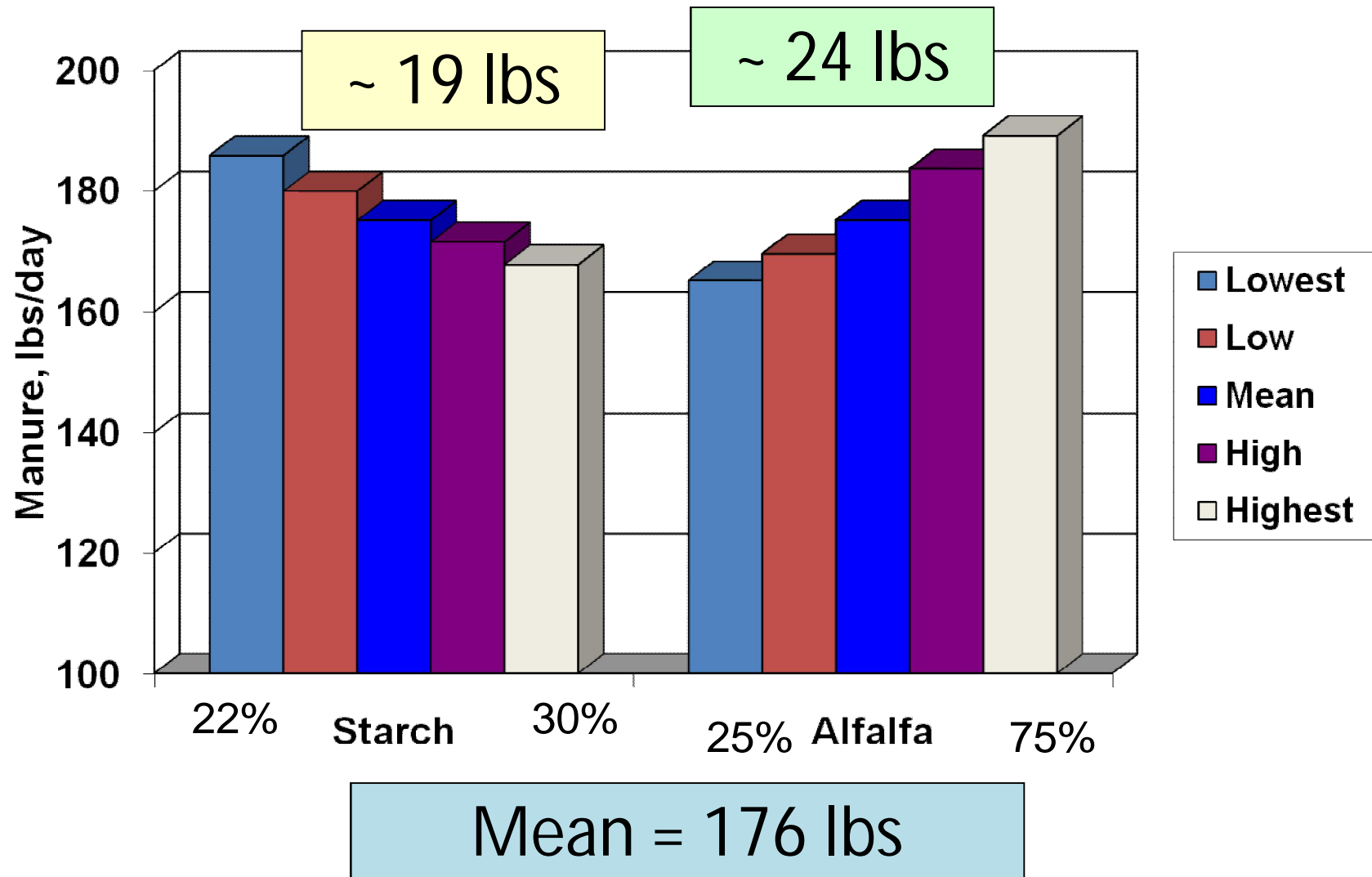
Manure Ammonia

$\text{NH}_3/\text{lb of Manure} * \text{lb Manure/cow} * \text{Cows}$

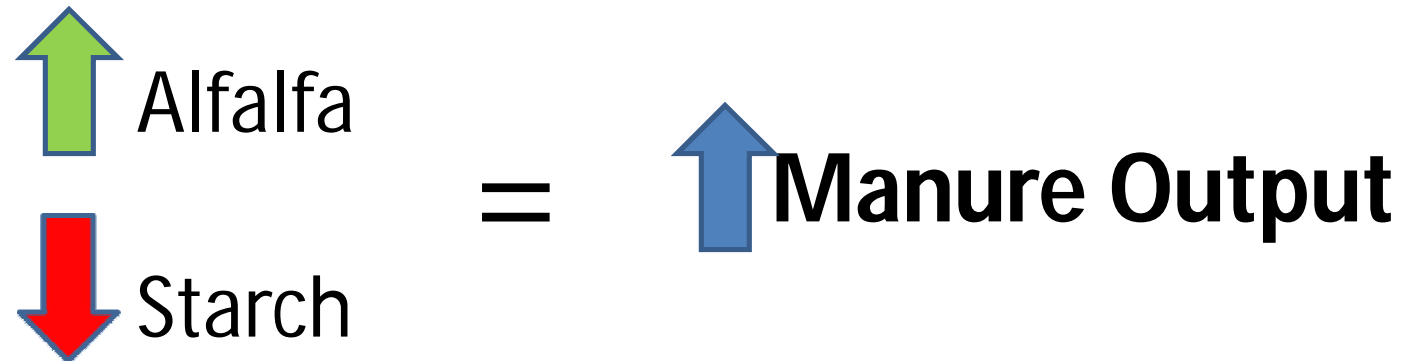
DIET



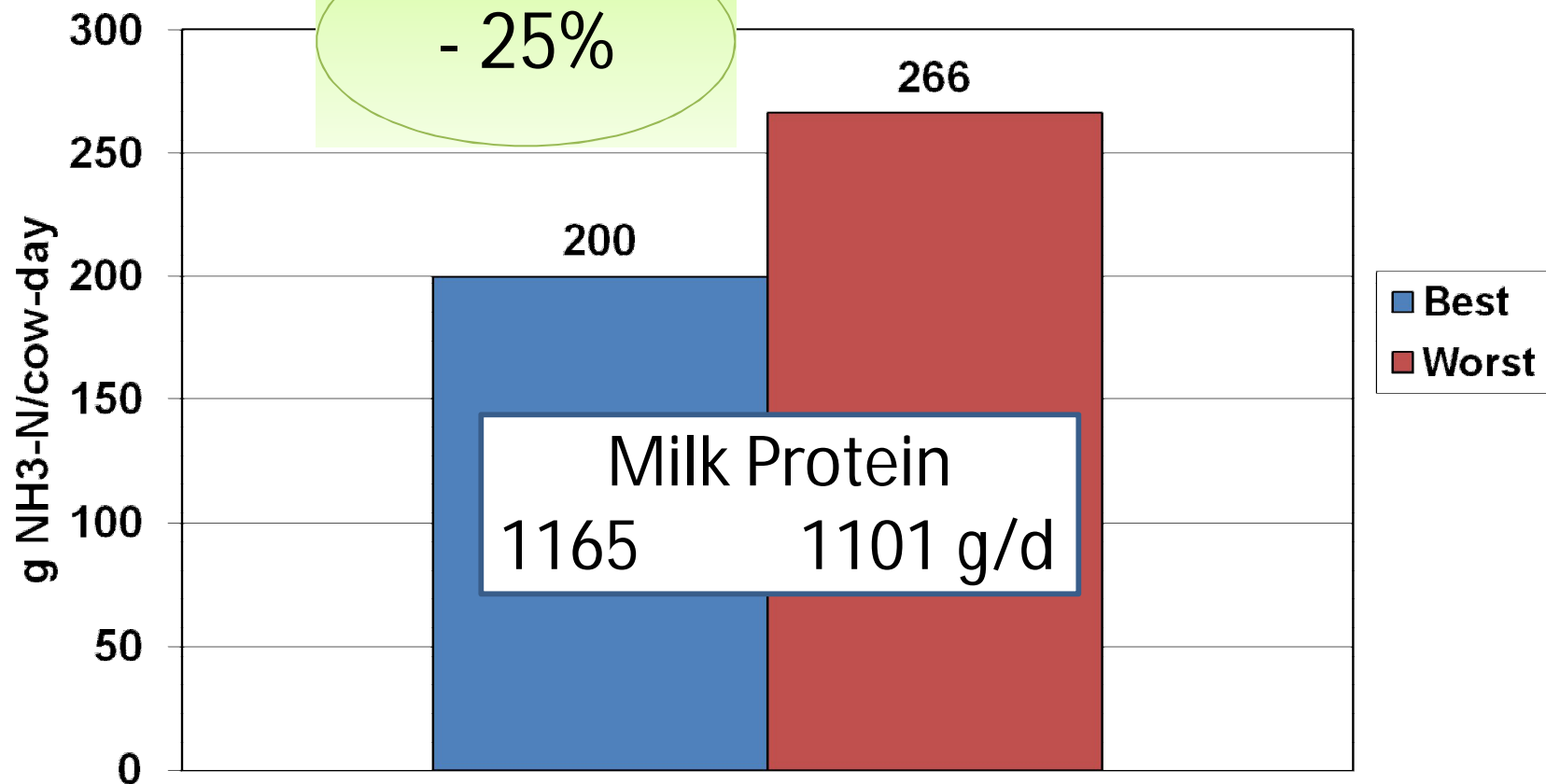
Manure output



Diet affects manure and manure ammonia differently



NH₃/cow-day



Best: 75% Alf, 11.1% MP, 30% Starch

Worst: 25% Alf, 12% MP, 22% Starch

To Reduce Manure NH_3 by **Dairy Industry**

1. Feed adequate (slight excess) protein
2. Feed high energy diets (starch)
3. Feed substantial amount of alfalfa *

* Land use and feed costs may limit this option



<http://dairy.osu.edu>

