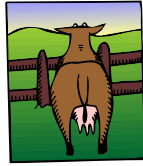
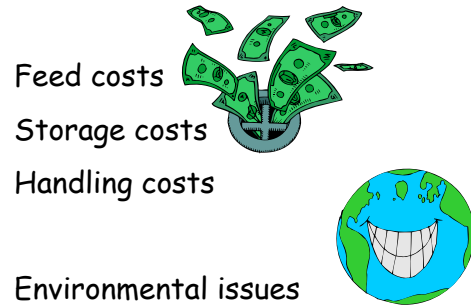


Factors Affecting Manure Excretion by Dairy Cows



Bill Weiss
Dept of Animal Sciences
Wooster 44691

Manure Output



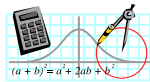
Feed costs

Storage costs

Handling costs

Environmental issues

The OSU Data Sets



• Manure Excretion

- 14 Experiments
- 55 Diets
- 232 Cows (or cow-periods)

• N and P Excretion

- 12 and 10 Studies
- 48 and 41 Diets
- 202 and 161 Cows

Diet Characteristics



	Mean	Range
Forage, % of DM	56	(40-80)
Corn Sil, % of forage	65	(0-100)
NDF, % of DM	33	(25-46)
CP, % of DM	17	(11-21)
P, % of DM	0.38	(0.31-0.50)

Cow Characteristics



	Mean	Range
Days in milk	183	(67-272)
BW, lbs	1331	(910-1780)
DMI, lbs/d	46	(22-67)
Milk, lbs/d	67	(18-130)

All cows were Holsteins >1 lactation

New Data Set (Preliminary)

- Designed to look at interactions
- Forage: 25-75% corn silage (alf silage)
- Starch: 22-30% (dry ground corn)
- CP: 14.4 -17.7% (SBM, trt SBM)

all diets ~10.5% RDP

15 diets, 108 observations

Means

DMI = 53
Milk = 84

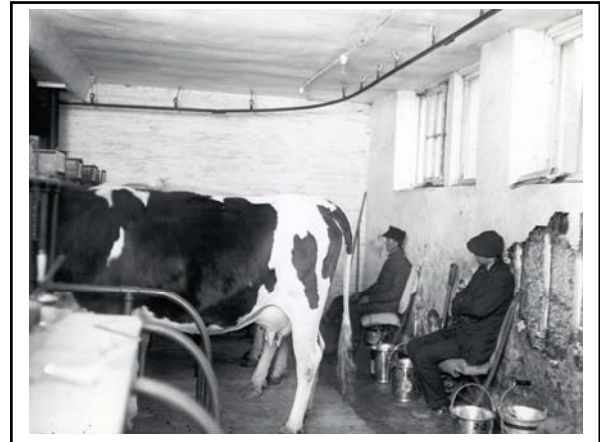
Three common questions for a 'manure expert'



"Are you nuts?"

"Why?"

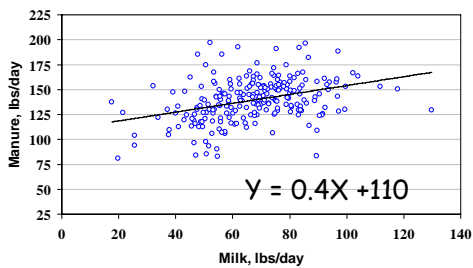
"How?"



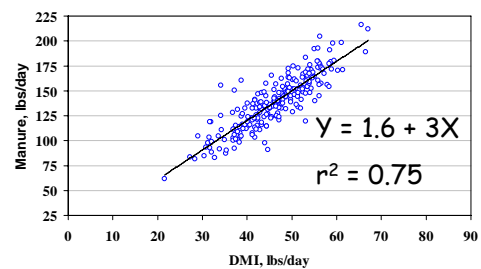
Average Daily Excretion

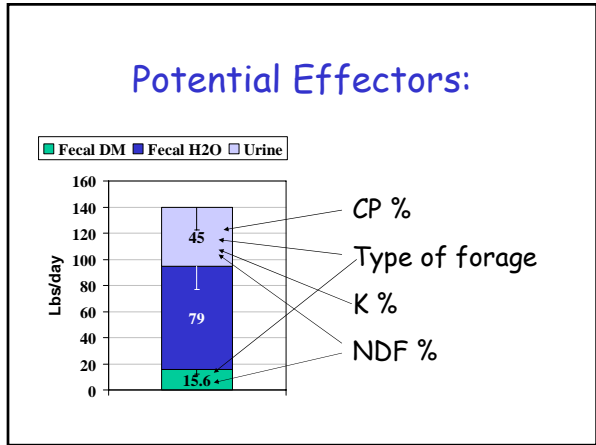
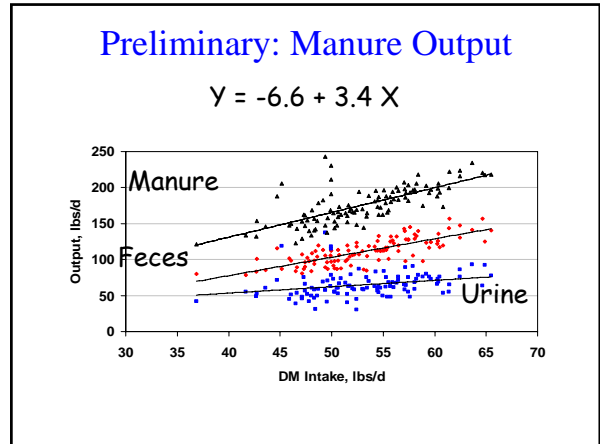
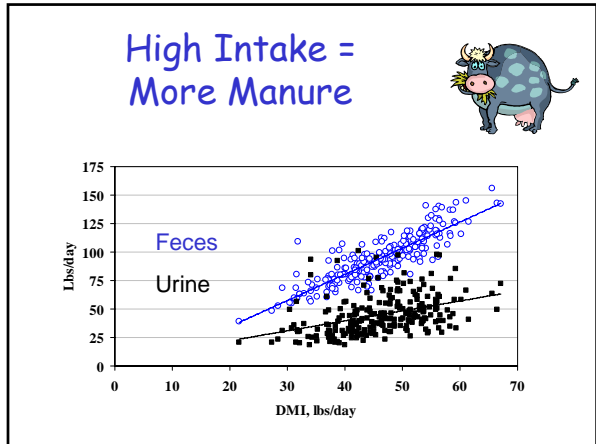
	Old	New
Wet feces, lbs	95	111
Urine, lbs (gal)	45 (5.4)	65 (7.8)
Manure, lbs	140	176
Water, %	87	88
DMI, lbs	46	53
Milk, lbs	67	84

High Milk ≠ More Manure





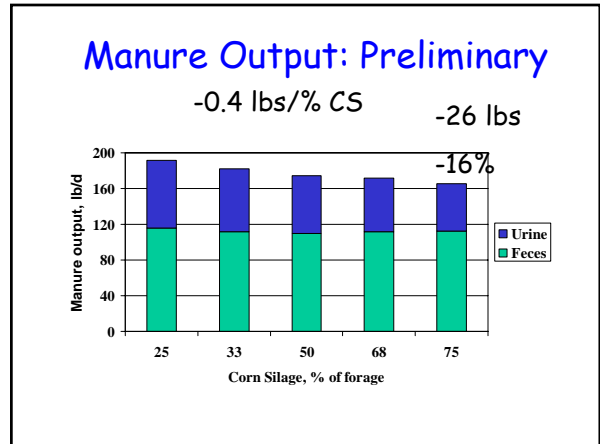
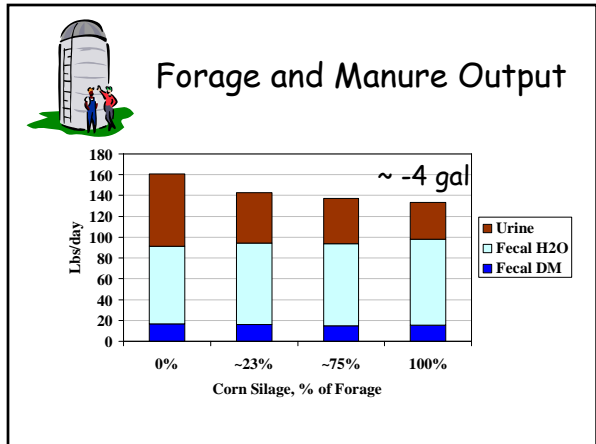
High Intake = More Manure








Manure Output (lbs/day)

	Slope	Range	Change
NDF:	+ 0.5 lbs/%	10	5 lbs (3.6%)
CP:	+1.9 lbs/%	4	8 lbs (5.4%)
CornSil	-0.41 lbs/%	100	41 lbs (29%)

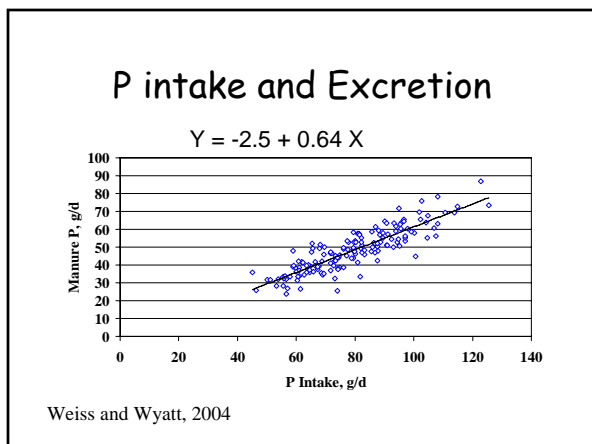
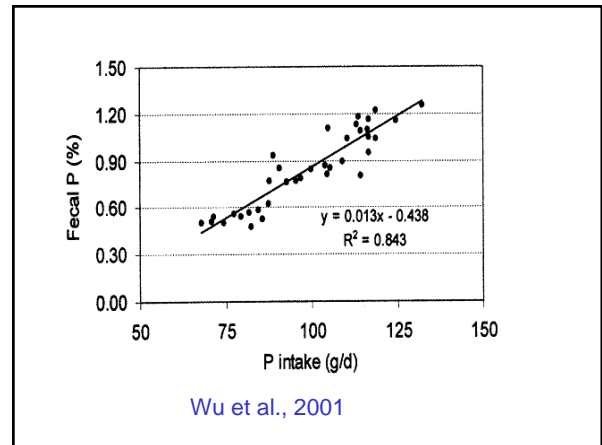
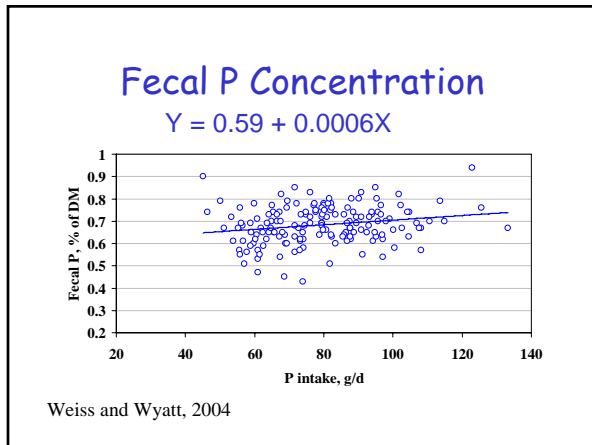
↓ Manure output = 
 (↓ storage/moving costs)

↓ N and P output =  EPA + 

P Averages

	Conc.	Amt/day
Diet	0.38% DM	79 g
Fecal	0.68% DM	46.9 g
Urine	0.025 g/L	0.5 g
Manure	0.077%	47.4 g

P eff. (milk+retained) 0.40



N Nitrogen

Atomic Number: 7

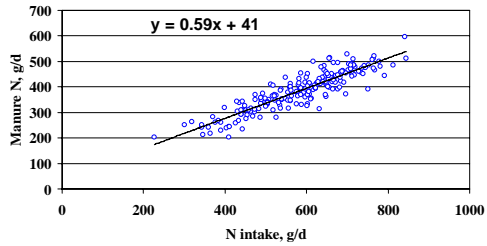
Atomic Mass: 14.01

N Excretion Averages

	Conc.	Amt/day
Diet CP	16.8% DM	7.8 lbs (564 g N)
Fecal N	2.79% DM	198 g
Urine N	9.1 g/L	186 g
Manure N	0.59%	385 g

N eff. (milk+retained) 0.34

N Intake and Excretion



N Excretion

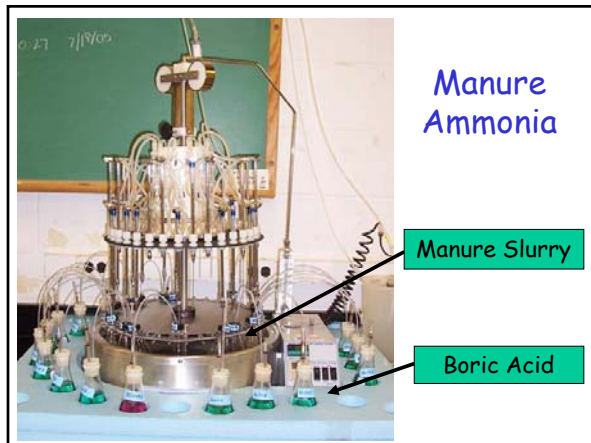
Major Factor: N (or CP) intake

Corn silage (% of forage) was only other significant factor

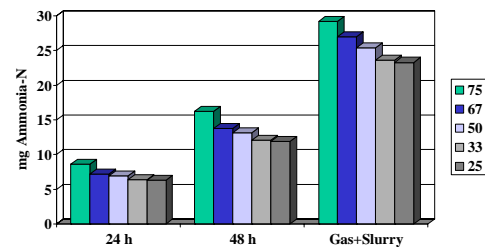
Manure N: -0.32g/% CS (-8% of mean)

Fecal N: -0.59g/% CS (-30%)

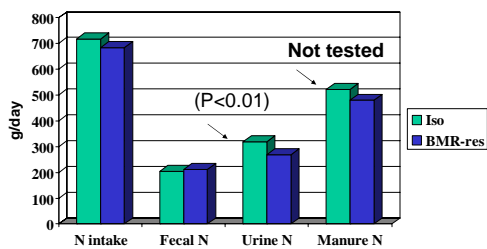
Urine N: +0.25g/% CS (+13%)



Ammonia N and Forage (% of forage as Corn Silage)



BMR Silage and N Excretion (Tine et al., 2001)



Hybrid effects on N excretion

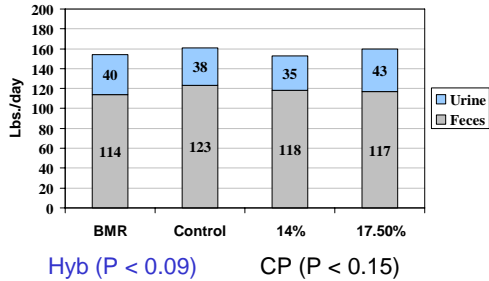
(Weiss and Wyatt, 2006)



- Mycogen F697 bmr vs 7511 FQ
48 h in situ NDFd = 59 vs. 50%
- 14 or 17.5% CP (mostly soy)
- Diets were 55% corn silage, 45% conc.

Manure Output

Hy: Feces $P < 0.07$ CP: Ur $P < 0.01$



N Excretion

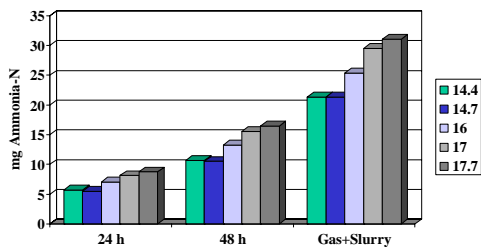
N intake: $+0.68$ g/g intake ($P < 0.01$)

Hybrid: BMR: -14.8 g/d ($P < 0.08$)

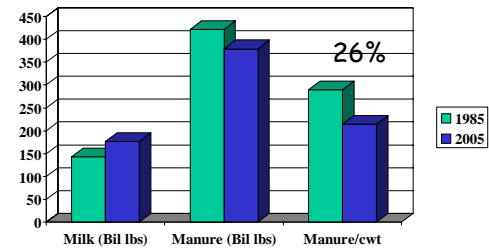
BMR reduced N excretion 3.6%
Literature range: -3.3 to -7.8%

Equal to $\sim -0.5\%$ unit change in diet CP

Ammonia N and Diet CP



Putting things in perspective



Summary

Avg Manure, lbs/day 140 (60 - 224)

↑ ~3 lbs/lb DMI

↓ 0.4 lbs/% corn silage

Avg P, g/d 48

↑ 0.65 g/g P intake

Avg N, g/d 385

↑ 0.63 g/g N intake