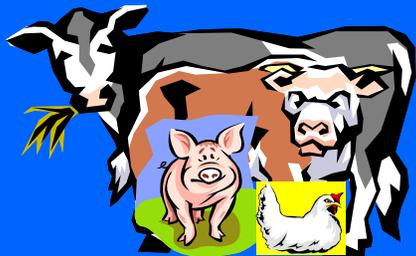


# Phosphorus and Potassium Feeding Practices on Oregon Dairies

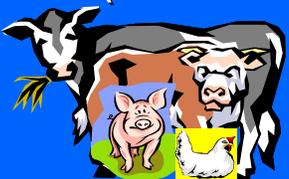
By Patrick French - OSU



WIN<sup>2</sup>ME - Western Integrated Nutrition and  
Nutrient Management Education  
“Feed Management Education for the Agricultural Professional”

# Historical P Feeding Reference

- P (>0.25% DM) improved conception rate in dairy cattle (Hignett and Hignett, 1951)
- WI dairy herds feeding 0.50% P (Shaver and Howard, 1995)
- U.S. survey dairies feeding 0.45-0.50% P (Wu et al., 2000)
- VA field study reported 0.49% P (Sink et al., 2000)



# Historical P Feeding Reference

- In 2001, P requirement reduced from 0.38% to 0.34% for a cow producing 70 lb milk/d
- Northeastern dairies producers feeding 0.44% P (Dou et al., 2003)
- Oregon dairies producers feeding 0.44% P (Higgs et al., 2003)
- No reproductive benefit of overfeeding P (Wu and Satter, 2000; Lopez et al., 2004 )



# Effect of Dietary P on Milk Yield

	P (% DM)	Milk yield (kg/d)
Call et al., 1987	0.24	17.3 <sup>a</sup>
	0.47	21.2 <sup>b</sup>
Valk & Šebek, 1999	0.24	39.0 <sup>a</sup>
Year 2	0.28	44.0 <sup>b</sup>
	0.33	45.0 <sup>b</sup>
Wu & Satter, 2000	0.38	29.6
(Year 1)	0.48	28.8
Wu & Satter, 2000	0.38	32.0
(Year 2)	0.48	32.1



# Potassium Animal Health Concern

- Forages have the ability to consume K in luxury amounts
- Implicated in the incidence of metabolic disease around the time of calving
- Use of high K forages increases the incidence of milk fever
- In 1998, Crill reported that Oregon dairy producers were overfeeding K by 2.5-fold in prepartum diets



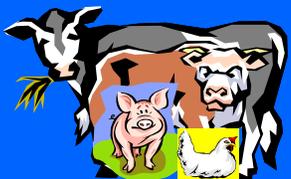
# Objectives

- Determine if Oregon dairy producers have adopted the new NRC (2003) P feeding recommendation
- Educate Oregon dairy farmers about the levels of P currently being fed on their farm
- Determine the changes in K feeding to dry COWS



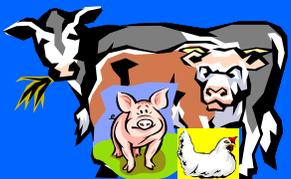
# Field Study

- 37 dairy farms
  - Valley and Coast
- 3 on site visits
- Survey (initial visit)
- Record diets
- Individual feed components
- Fecal and urine samples
- DHIA summary sheets



# Characteristics of Participant Farms

	Region			
	Coast		Valley	
	Small	Large	Small	Large
Farms	10	10	8	9
Herdsizes	101	278	198	800
Milk Yield, lb/d	56.5	64.9	77.7	78.3
Acres:Cow	1.70	1.05	0.94	0.54
Grazing Farms	9	8	6	3
Bordering Water	8	10	7	8



# P Intake and Excretion – Lactating Cows

	Region		Herdsizes	
	Coast	Valley	Small	Large
Diet P, % DM	0.41	0.39	0.40	0.40
Fecal P, % DM	0.90	0.89	0.92	0.87
Urinary P, mg/dl	2.22	2.94	2.13	3.04
Diet P, g/d	95	101	94	100
Fecal P, g/d	60	66	62	62
Urinary P, g/d	0.5	0.7	0.5	0.7

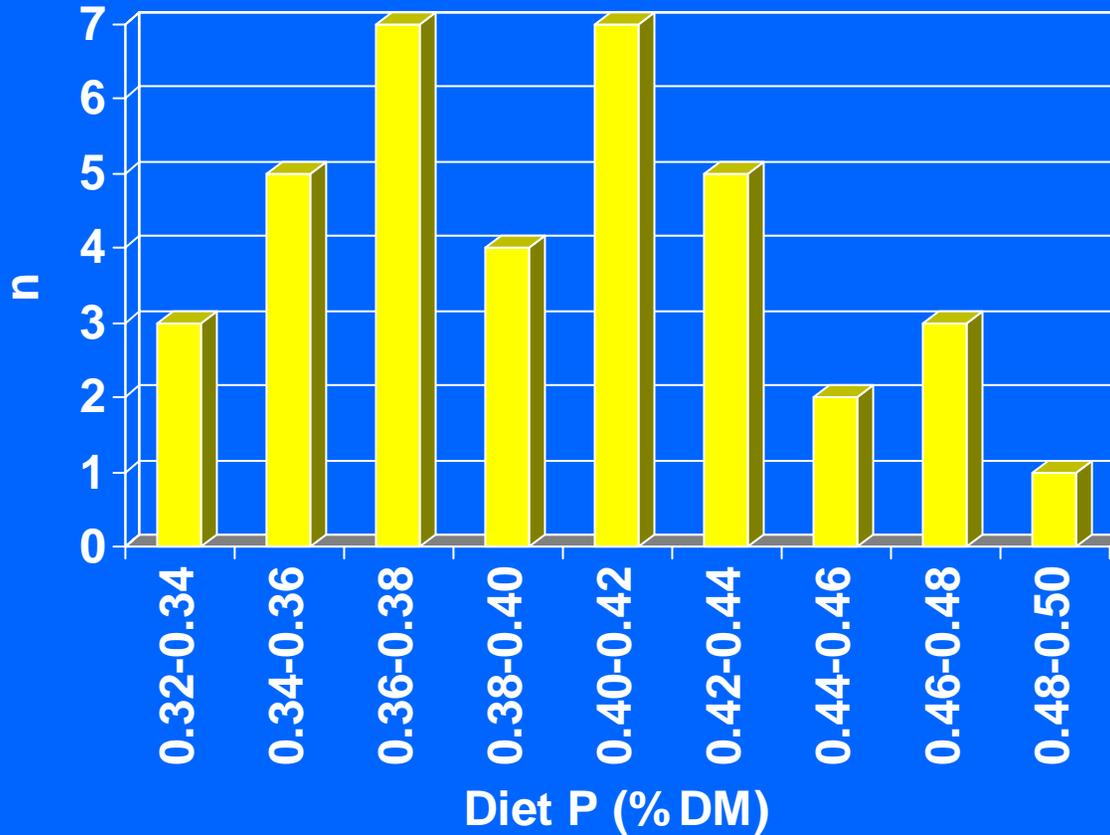


# P Intake and Excretion – Dry Cows

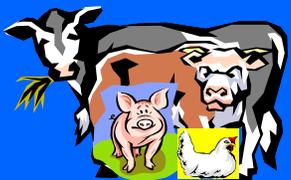
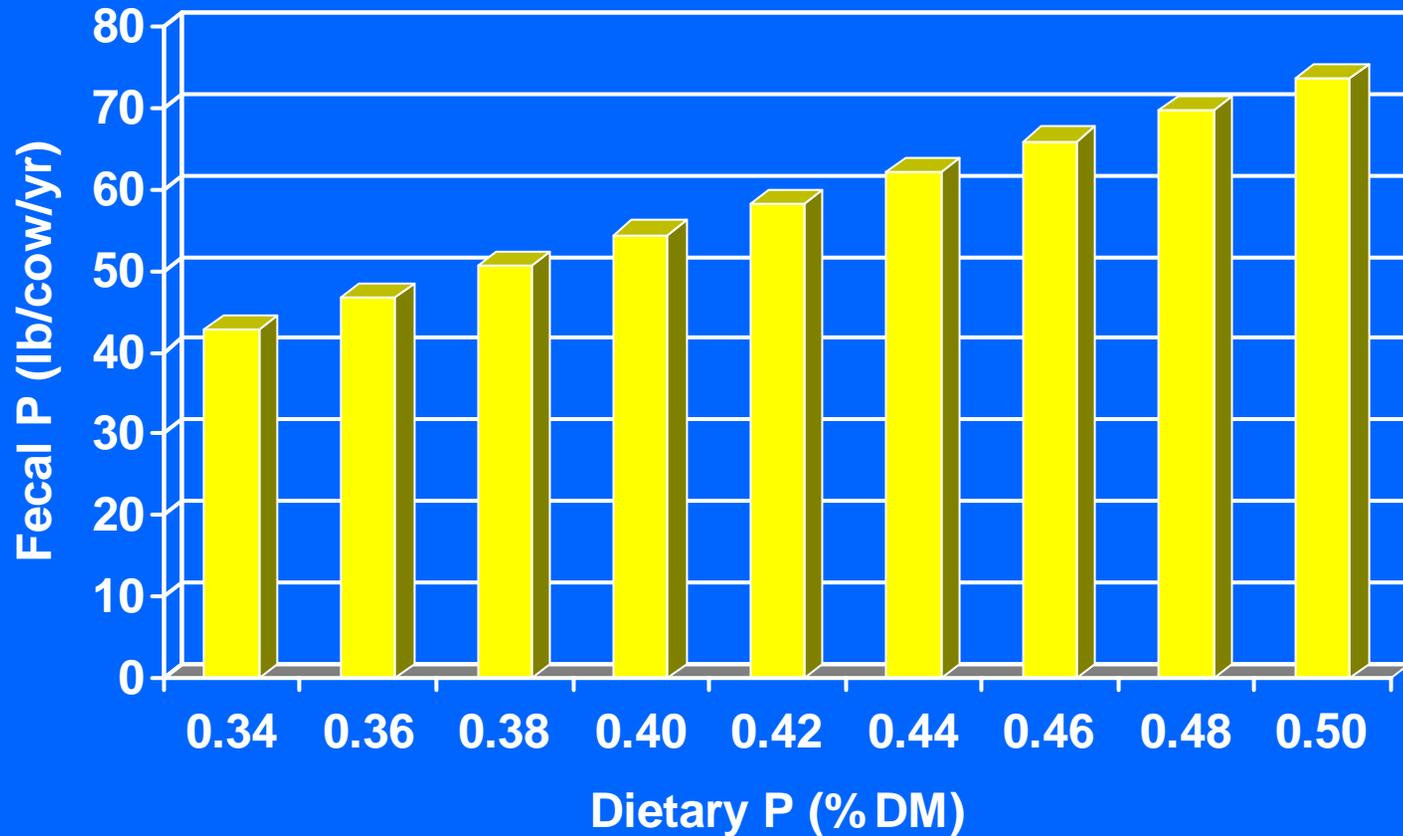
	Region		Herdsizes	
	Coast	Valley	Small	Large
Diet P, % DM	0.30	0.32	0.30	0.32
Fecal P, % DM	0.77	1.02	0.88	0.91
Urinary P, mg/dl	1.40	2.05	1.52	1.94
Diet P, g/d	47.6	50.8	47.6	50.8
Fecal P, g/d	27.2	36.1	31.1	32.2
Urinary P, g/d	0.23	0.46	0.34	0.43



# Distribution of Dietary P by Farm

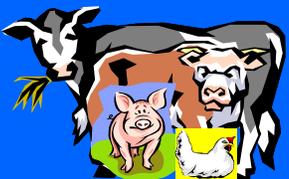


# Predicted Fecal P Excretion



# Overall Oregon Results

Herdsizes	339
Milk Yield, lb	68.1
Diet P, % DM	0.40
Annual P Intake, lb	78.4
Annual P Excretion, lb	52.3
Apparent Digestibility, %	33

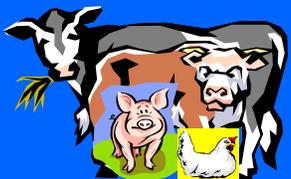
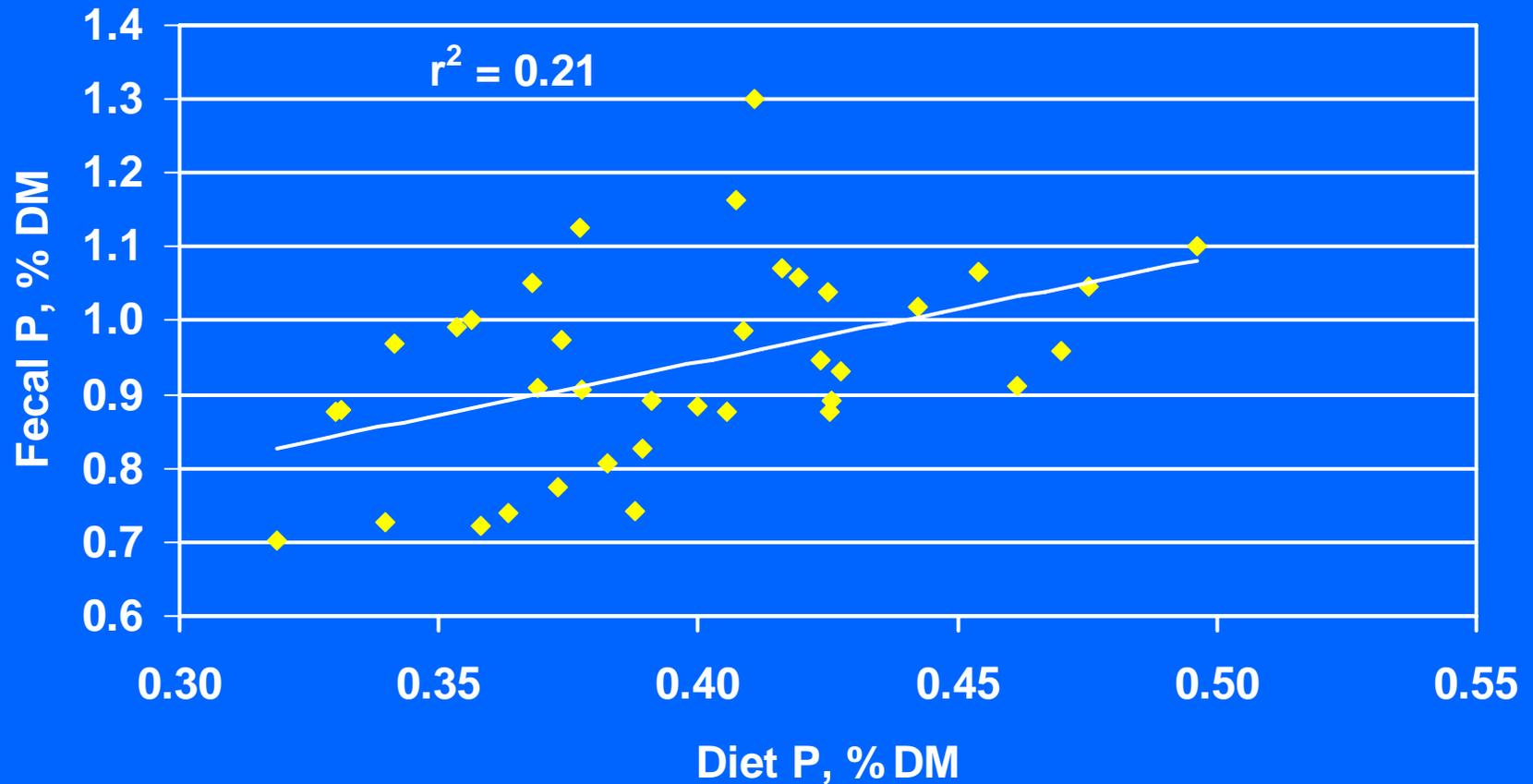


# Comparison of Results to WI

	Oregon	Wu et al.
Diet P, % DM	0.40	0.39
Milk Yield, lb/d	68.1	80.4
Feed Intake, lb/d	<b>53.7</b>	55.1
P Intake, g/d	<b>97.6</b>	97.5
Fecal P, % DM	0.93	0.83
Fecal P, g/d	<b>65</b>	66
App Digestibility	<b>33</b>	33



# P Intake and Fecal P



# P Content of Valley Feeds in Lactating Cow Rations

	% P (DM)	% fed
Alfalfa	0.25	98.0
Corn silage	0.22	86.3
Mineral	1.35	84.3
WCS	0.72	68.6
Distillers	0.69	52.9
Grass, harvested	0.20	49.0
Beet pulp	0.10	49.0
SBM	0.81	41.2
Canola meal	0.97	37.3



# K Intake and Excretion – Lactating and Cows

	Region		Herdsizes	
	Coast	Valley	Small	Large
<b>Lactating</b>				
Diet K, % DM	1.84	1.58	1.79	1.63
Fecal K, % DM	0.60	0.58	0.62	0.56
Urinary K, mg/dl	10.8	0.87	10.8	0.87
<b>Dry</b>				
Diet K, % DM	2.05	1.93	2.02	1.96
Fecal K, % DM	0.80	0.65	0.69	0.76
Urinary K, mg/dl	11.3	1.12	11.0	11.6



# K Content of Valley Feeds in Dry Cow Rations

Feed	% K (DM)	% fed
Alfalfa	3.12	70.6
Corn Silage	1.12	60.8
Oat Hay	2.16	45.1
Grass Silage	3.01	37.3
Distillers	1.16	25.5
Canola	1.39	23.5
Grass hay	2.47	23.5
Clover silage	2.71	19.6
SBM	2.60	15.7



# P Summary

- Average P concentration of lactating cow diets was 0.40% (DM basis)
- Based on milk yield, concentration of P in diets should have been 0.34% P (NRC, 2001)
- Although P was being overfed by approximately 18%, the magnitude of overfeeding was less than reported by similar surveys in the eastern U.S.
- Reducing dietary P to requirement would reduce P excretion by 11 lb/cow/yr



# K Summary

- Average K concentration of dry cow diets was 1.99% (DM basis)
- Based on requirement, concentration of K should have been  $\leq 0.62\%$  K (NRC, 2001)
- K was being overfed by 350%
- Over the last 5 years K in dry cow diet have increased 19%
- The ability to grow/purchase low K forages for dry cow rations will continue to challenge the industry

