

RECENT DISCOVERIES
For
PROCESSED PEAS

EFFECTS ON FEED PROCESSING

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FIELD PEAS

Excellent alternate ingredient source of protein and energy.

Has found acceptance in:

- **Pigs**
- **Broilers**
- **Beef rations**
- **Dairy rations**
- **Aqua feeds (shrimp)**

FIELD PEAS

Several studies have documented the effects of various processes such as grinding, pelleting, extrusion and roasting ON the nutritional value of peas.

FIELD PEAS

**However,
no scientific reports were found documenting
the effect of field peas on feed
manufacturing processes.**

QUESTIONS POSED TO KSU BY THE SASKATCHEWAN PULSE GROWERS

- 1. How easily do peas grind? Efficiency?**
- 2. What is the resulting particle size?**
- 3. How do they affect pellet quality?**
- 4. How do they affect pelleting efficiency?**
- 5. What are the functional properties in a pea/corn Vs. a corn diet?**

STUDY OBJECTIVES

- 1. Determine the energy to grind to a target particle size.**
- 2. Determine the effect of ground field peas on the pelleting process and the resulting pellet quality.**

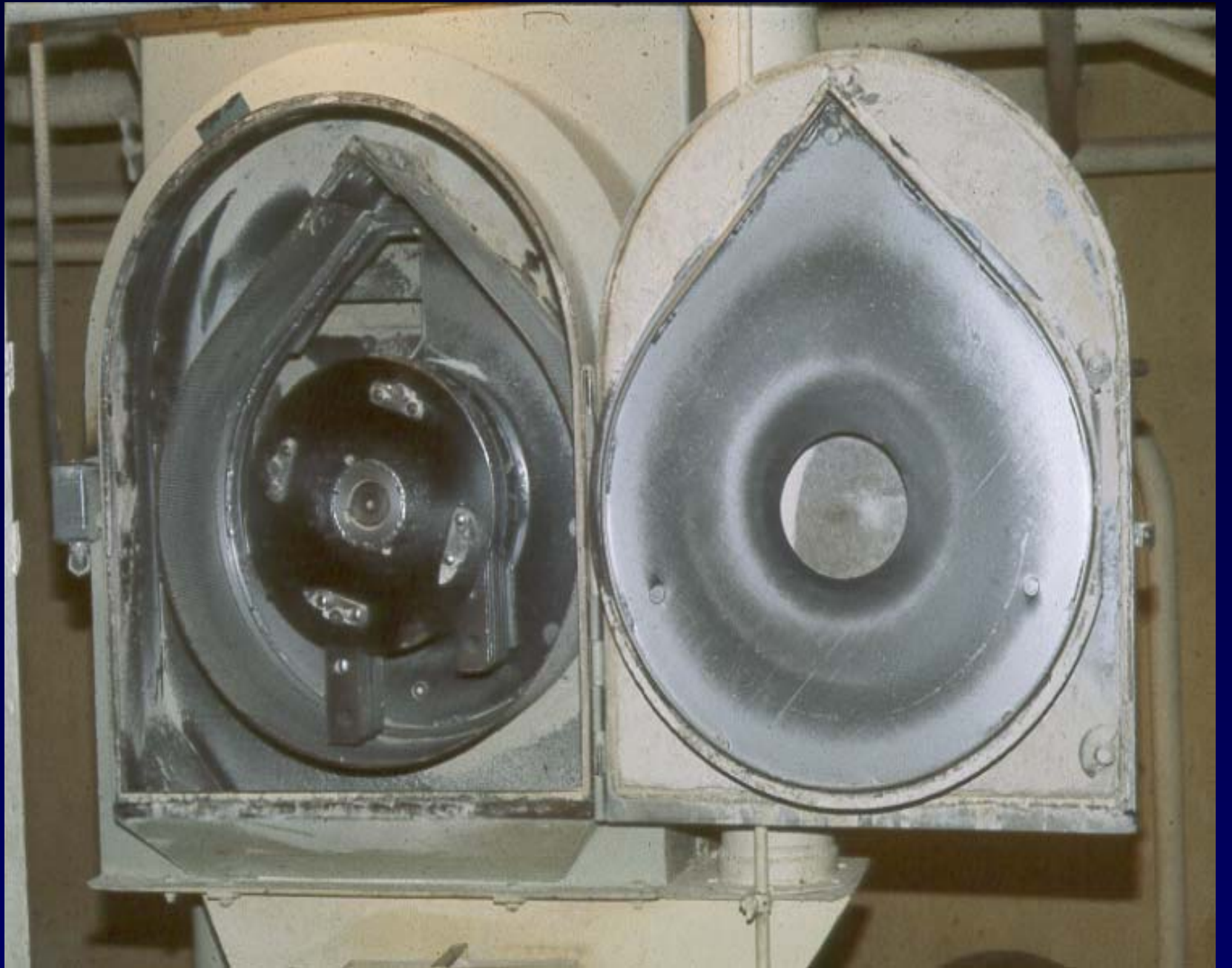
GRINDING STUDY

Equipment: Jacobson P240 HM w/ 8/64”
(3.2mm) hole screen.

Load: Constant at 75%.

Record: Amps, Total Production, Run time,
Particle size, and Particle variability

Report: Total Energy(Kwh/T), Rel. Energy(Kwh/T)
Particle Size(microns) , Sgw, and Bulk
density (lbs/ft³ and Kg/hL)



DETERMINING PARTICLE SIZE

GRINDING STUDY RESULTS

TREAT.	PROD. RATE (lbs/hr)	RELATIVE ENERGY (Kwh/T)	TOTAL ENERGY (Kwh/T)	BULK DENSITY (lbs/ft³)	PARTICLE SIZE (μ)	Sgw
CORN	5341	3.97	7.33	37.7	522	2.15
PEAS	4902	4.37	8.00	46.8	484	2.41

GRINDING STUDY DISCUSSION

1. Slightly more difficult to grind than corn.
2. Resulting particle size slightly smaller than corn
(522 μ Vs. 484 μ)
3. Ground pea particles were slightly more variable
4. Grinding should not cause a problem in typical feed mills.
5. Flow characteristics are not much different than ground corn.

PELLETING

PELLETING OPERATIONS



IS PELLETT QUALITY

IMPORTANT

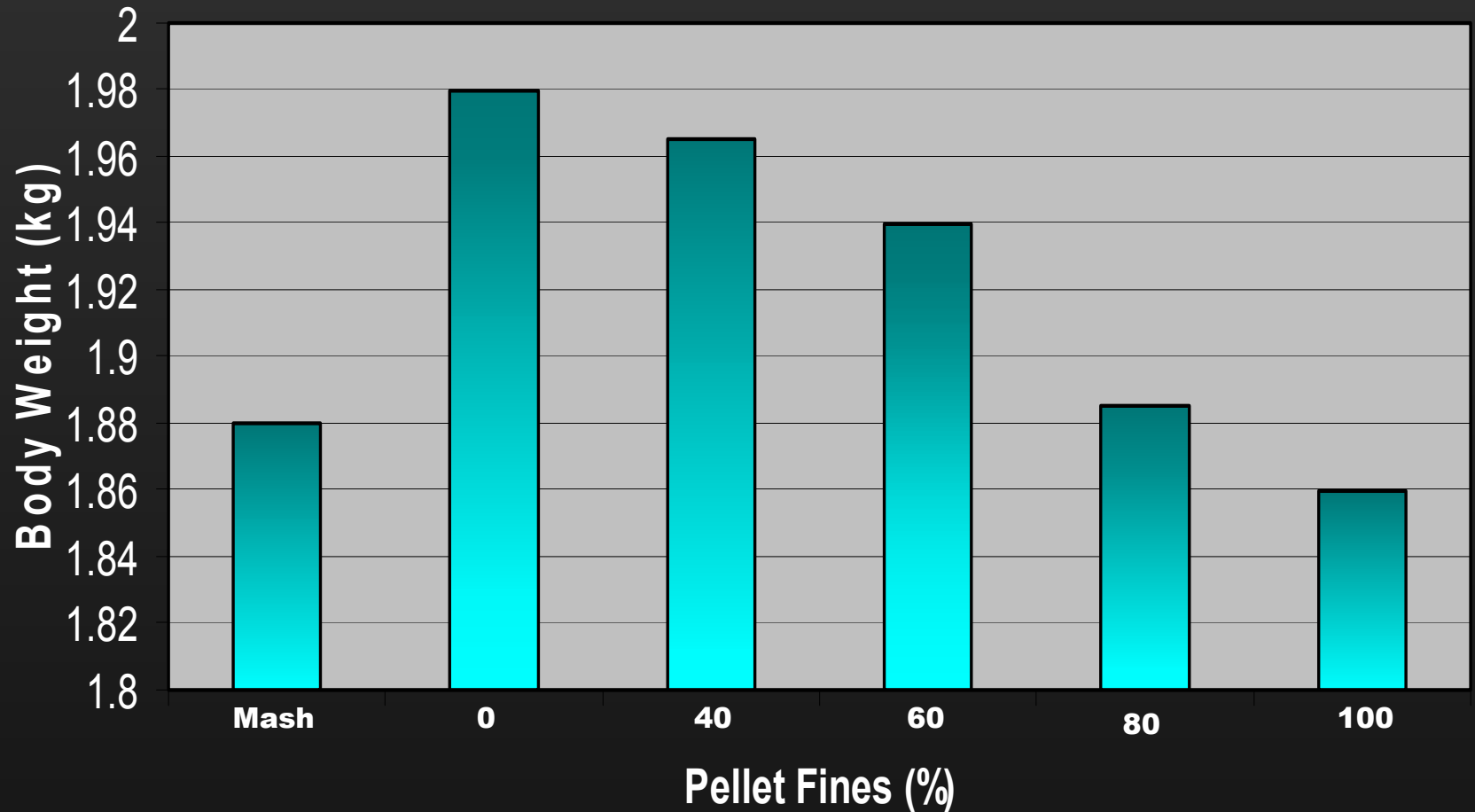
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North Carolina Pellet Quality Survey

<u>Sample Location</u>	<u>Av. Fines (%)</u>
Pellet Mill Cooler	33
Truck (at Farm)	52
Feed hopper	59
Pan (Auger system)	63
Pan (chain drag system)	73

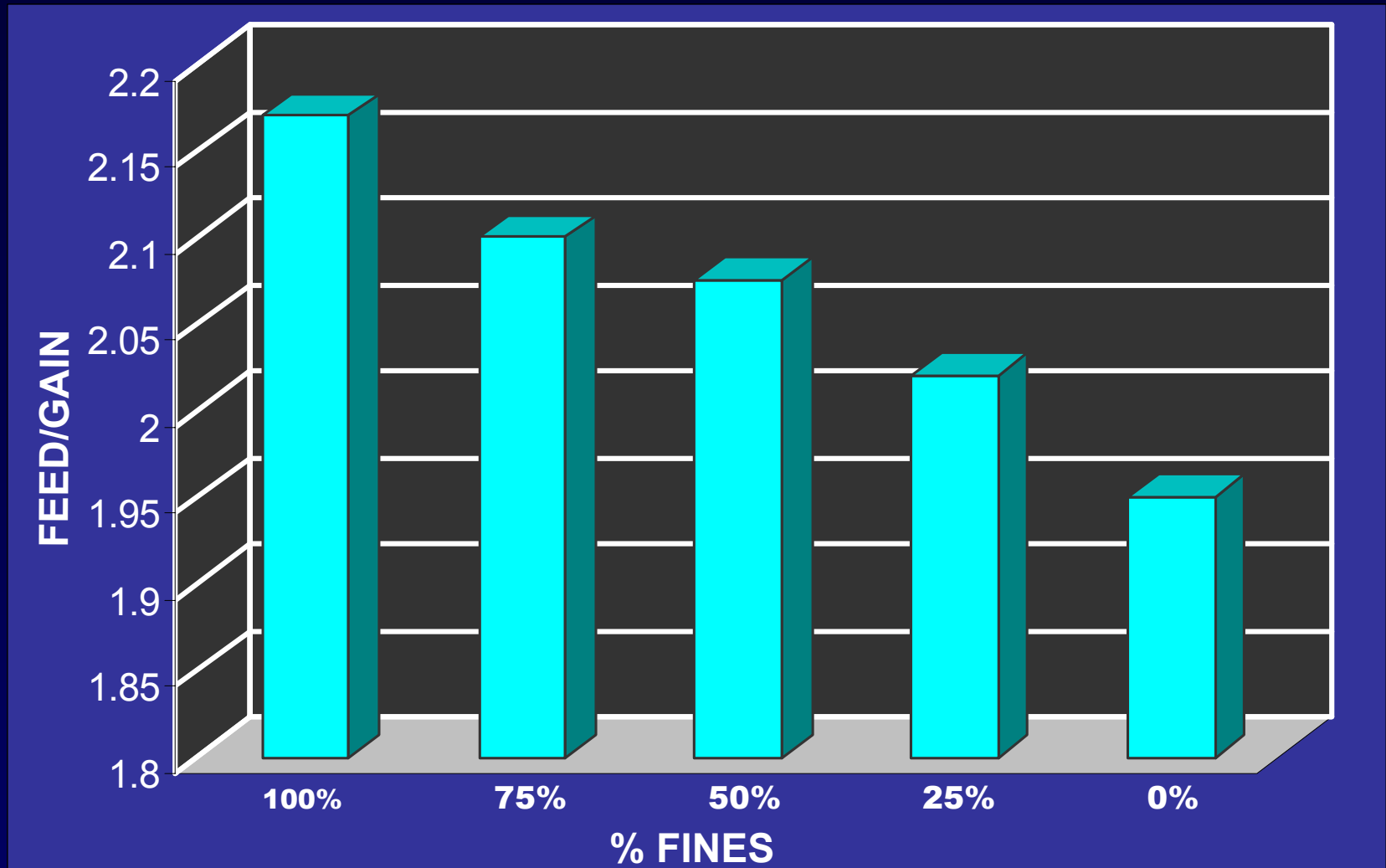
Scheideler, 1995

Effects of Fines on Growth Rate of Broilers



Beyer et al. 2000

Effect of Fines on Broiler Feed Conversion



Beyer et al. 2000

PELLETING STUDY

Objective:

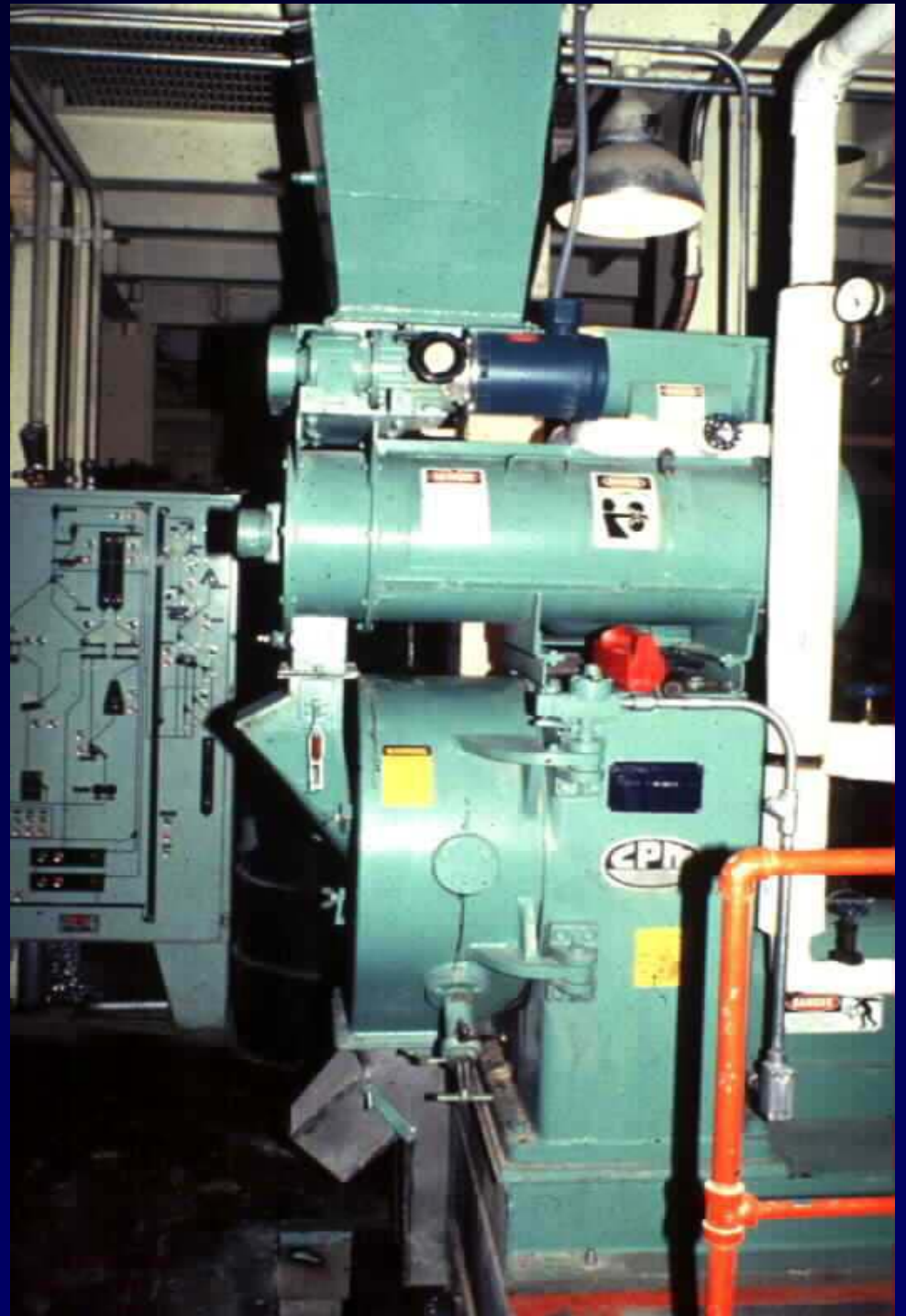
To evaluate the effect of level of inclusion of field peas on the pelleting process.

PELLETING STUDY

Procedures:

- 1. CPM “Master HD” model pellet mill.**
- 2. 4mm X 31mm die.**
- 3. Conditioned mash to 80 C**
- 4. Amp load recorded.**
- 5. Production rate and time recorded.**
- 6. Fines return determined.**
- 7. Pellets for PDI were taken from mill and cooled.**
- 8. Feed rate kept constant.**

**The Pellet
Mill at K-State**



FORMULAS for PELLETING STUDY

Lower Energy Pig Diet

INGREDIENT	CONTROL	5%	10%	15%	30%
		PEA	PEAS	PEAS	PEAS
	-----% of diet-----				
Gnd Corn	64.8	61.57	58.3	55.14	45.56
Soy Bean Meal	31.7	29.91	28.1	26.34	20.94
Gnd Field Peas	-----	5.00	10.00	15.00	30.00
Limestone	1.02	1.02	1.02	1.02	1.04
MonoCal Phos.	0.8	0.8	0.8	0.8	0.8
Salt	0.27	0.27	0.27	0.27	0.26
Vit Pmx	0.25	0.25	0.25	0.25	0.25
TM Pmx	0.15	0.15	0.15	0.15	0.15
Soy Oil	1.00	1.00	1.00	1.00	1.00

PELLETING STUDY RESULTS

Low Oil Formulas (1% Oil)

TREAT.	PROD. RATE (lbs/hr)	FINES (%)	TOTAL ENERGY (Kwh/T)	RELATIVE ENERGY (Kwh/T)	STD. PDI (%)	MOD. PDI (%)
CONTROL	4342	4.64	7.3	3.8	84.0	77.6
5% PEAS	4440	4.26	6.6	3.2	88.8	86.4
10% PEAS	4082	3.4	7.7	3.9	91.8	89.9
15% PEAS	4415	6.36	8.4	4.9	91.9	89.3

PELLETING STUDY

RESULTS-Low Energy Diets

- 1. Pellet quality was improve with each increment increase in pea inclusion/**
- 2. Inclusion of up to 10% ground peas resulted in no instability in the pellet mill.**
- 3. Inclusion of levels greater than 15% were not successfully pelleted (low oil diets).**

FORMULAS for PELLETING STUDY

High Energy Pig Diet

INGREDIENT	CONTROL	30% PEA
	-----% of Diet-----	
Gnd Corn	61.11	41.91
Soy Bean Meal	32.34	21.6
Gnd Field Peas	-----	30.00
Limestone	1.01	1.02
MonoCal Phos.	0.8	0.8
Salt	0.27	0.27
Vit Pmx	0.25	0.25
TM Pmx	0.15	0.15
Soy Oil	4.00	4.00

PELLETING STUDY RESULTS

High Oil Formulas (4%Oil)

TREAT.	PROD. RATE (lbs/hr)	FINES (%)	TOTAL ENERGY (Kwh/T)	RELATIVE ENERGY (Kwh/T)	STD. PDI (%)	MOD. PDI (%)
CONTROL	4173	6.5	6.75	3.05	80.1	75.4
30% PEAS	4200	2.67	7.90	4.25	93.1	91.4

PELLETING STUDY

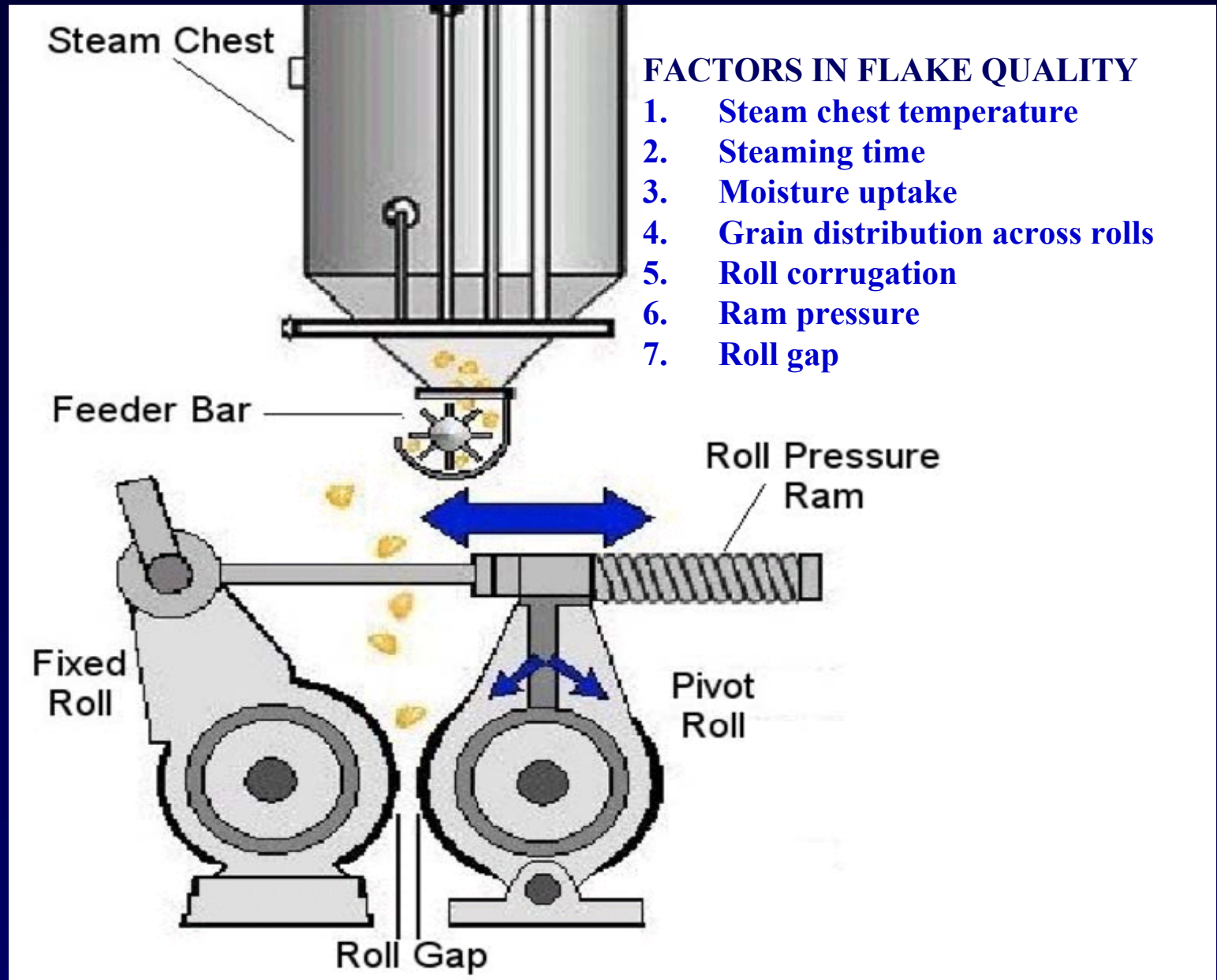
RESULTS-High Energy Diets

- 1. A diet with 30% ground peas and 4% oil was easily pelleted**
- 2. Pellet quality, even with a high level of oil addition, was excellent when 30% ground peas were included in the diet.**

FLAKING STUDY

STEAM FLAKING SYSTEM

Figure 4. Steam flaker component illustration.





FIELD PEAS



CORN

FLAKED GRAINS

FLAKING RUN RESULTS

- 1. Field peas are much easier to flake than corn**
- 2. Flakes are clean, smooth and durable**
- 3. Level of gelatinization was not high Vs. corn**

SUMMARY AND CONCLUSIONS

- 1. Inclusion of ground field peas at up to 10% caused no problems in pelleting.**
- 2. Generally resulted in improved pellet quality.**
- 3. Inclusion of ground peas at 30% allowed the use of high oil level in the mash and still make excellent quality pellets**
- 4. Grinding field peas is not much different than grinding cereal grains.**
- 5. Steam flaking field peas was easily accomplished.**