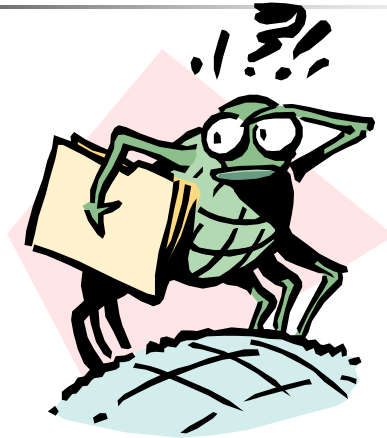


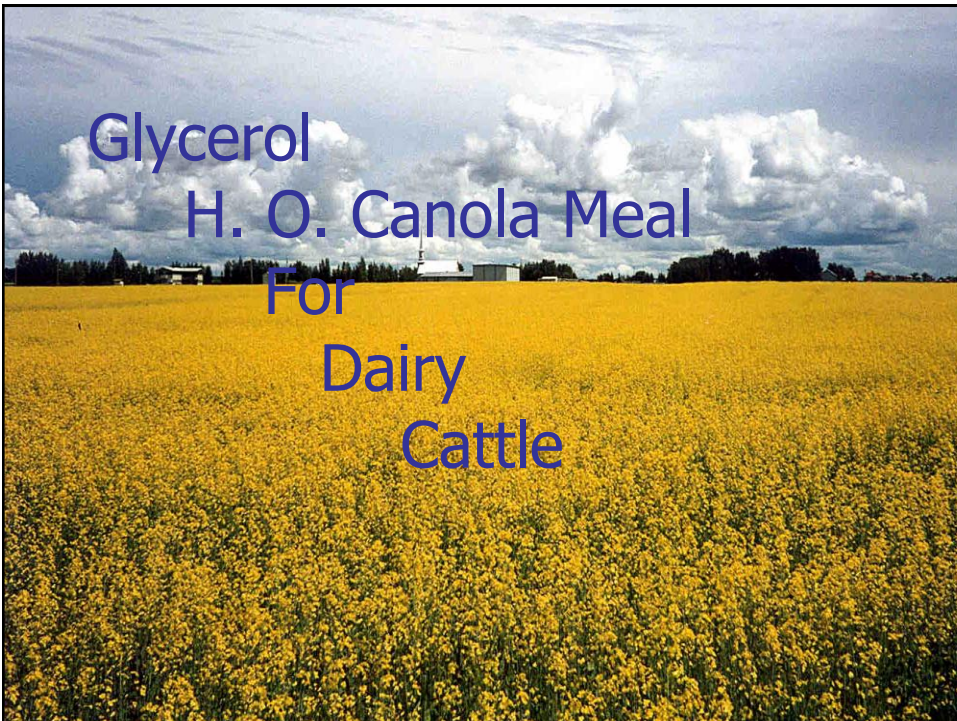
## Canola beyond Feed and Suppositories


### "Opportunity From Bio Diesel Production"

(Vern Racz and B. Laarveld, Animal and Poultry Science, U of S)




Glycerol  
H. O. Canola Meal  
For  
Dairy  
Cattle





## Glycerol from Biodiesel


- Colorless, Odorless
- Sweet tasting, hygroscopic viscous liquid
- Sugar alcohol, highly soluble in water
- Research indicates energy similar to corn
- Glycogenic substance with high digestibility
- 10% of oil processed for bio diesel
- Feed problem
  - Salt content
  - Methanol content (150 PPM in feed, USDA)



## Glycerol: Variable Analysis (Depends on source)

(Glycerol Byproduct of Biodiesel production for Ruminants, Schroder A and K. Sudekum, University of Kiel, Germany.)


Variable/Purity	Low	Medium	High
Water%	25 – 28	10 - 12	2.0 -3.0
% of DM Glycerol	60 – 65	85 - 90	98 -99
Ether Extract	0.8 – 6	0.4 – 0.7	?
P	0.9 -1.5	2.0 – 2.5	?
Na	0.11	0.09	?
Methanol	24 -27	0.04 – 1.0	



## Glycerol (Present Position)

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- Licensing as feed is coming?
- Beef= <0.1% methanol and 5% of feed as glycerol (temporary use permit)
- Dairy will follow
- Others, US = <0.15%and (10, 15%)
- Europe expert committee =0.5%methanol and up to 10% of diet



## High Oil Canola Meals

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- Most arise from processing non food grade canola (Bio diesel, and other)
- Use of distressed canola a critical part of efficient canola production
- Use of Meal critical to canola production and bio diesel production.
- Allows production of specialized feeds
- Usually a product of cold press extrusion with no solvent extraction
- They are different and should be recognized for their differences.
- Variation exists between plants in feed value and utility of these canola meals



## Analysis Canola Meals (DM. basis) (cold press compared to solvent extraction)

Nutrient	Milligan Bio meal	RCM
Moisture %	4.50	10.00
CP %	38.12	38.88
E.E.(oil) %	12.60	3.88
Ash %	6.63	6.66
C. Fibre %	12.62	13.33
ADF %	19.63	19.11
Calcium %	0.64	0.70
Phosphorus %	1.09	1.14
Est. TDN %	81 – 83	74.50
Est. DE. Kcal/Kg	3900	3450

Note: RCM values from Canola industry Guide; M. Bio meal av. Of analysis



## Analysis Canola Meals : Toxins and Others

Parameter	Milligan Biomeal
Aflatoxin ppb.	6.48
Vomitoxin ppm.	<0.2
Zearalenone ppb.	20.0
Salmonella	Negative (n=4)
E. Coli cfu/gm	<100 (0-100=threshold)

Milligan Bio tech is ISO 9000 certified  
Eliminates any add back to processed meal  
Separate screenings and sell separately

Note: M. Bio meal av. Of analysis



### Comparing Canola Meal Types:

Effect on Rumen Fermentation and nutrient Flow to the Duodenum in Beef Heifers: Can. J. of AN. Sci. 2009; G. Gozho, J. McKinnon, D. Christensen, V. Racz, T. Mutsvangwa. U of S

Compared: RCM; RCM+ 1.8% oil; CPC (Milligan Bio Meal); RUP+ 1.32% oil.

-- Barley grain and barley silage based diets

--- Oil added to have same level

Diets:

DM = 64%

OM = 95%

ADF 13.4%

NDF 28.2%

CP = 12.1%.



### Effect of Protein supplements on:

<u>Item</u>	<u>RCM</u>	<u>RCMO</u>	<u>CPC</u>	<u>RUCMO</u>
<u>Total Tract Dig.</u>				
OM.	76.3	75.7	76.5	74.9(a)
NDF	50.5	48.6(a)	50.6	46.3(a)
ADF	48.1	44.6(a)	46.2	42.7(a)
<u>Flow to Duodenum</u>				
Total N g/day	138	132	135	135
Ammonia N g/day	2.40	1.65	1.76	1.79
Microbial N % of intake	80.1	79.3	78.0	79.7
<u>Amino Acids g/day</u>				
Lysine	54.9	50.4	56.0	56.0
Methionine	11.0	11.1	12.3	13.2
Threonine	36.1	35.2	38.6	37.6

Values at  $p < .01$

## Summary of CPC

1 + 1 = 2+



- \* Decreased ammonia N with oil addition
- \* Adding free oil not the same as CPC oil
- \* CPC as good as or equal protein source as the other protein sources

### Advantages:

Oil reduces NH<sub>3</sub> N and CH<sub>4</sub>, and thus reduces environmental impact  
 Excellent form and amount of both protein and energy to promote efficient rumen fermentation  
 Can be used to make specialized feeds  
 Results are similar in swine and poultry diets  
 Source of bypass oil and protein

Value More than RCM

## Feed Value of Glycerol




## Effect Of Glycerol Level on Feed Intake and Milk Production (Mature cows, 4X4 latin sq. 2 reps, 8 cows, 4 periods, 28 days)

Variable	control	0.6 Kg	1.2 Kg	2.4 Kg	
DMI(kg/D)	26.16	26.88	26.63	26.75	
WG(gm/D/cow)	-32	310	166	408	
Milk Kg/D/cow	43.56	45.92	46.06	46.86	
FCM Kg/D/cow	39.21	42.25	40.18	40.70	
ECM Kg/D/cow	40.05	41.90	42.34	42.65	
Ratio DMI/FCM	0.69	0.64	0.69	0.66	
Fat %	2.88	2.89	2.87	2.82	
Protein %	3.18	3.20	3.20	3.24	

## Glycerol Trial Results

- Palatable, high energy feed
- Milk yield, WT. gain, E C Milk increase
- High levels need fibre to prevent BF depression
- Summer preference Trial  
8 cows showed strong preference for glycerol (40 minutes of feeding = 2 to 3 kg difference in intake)



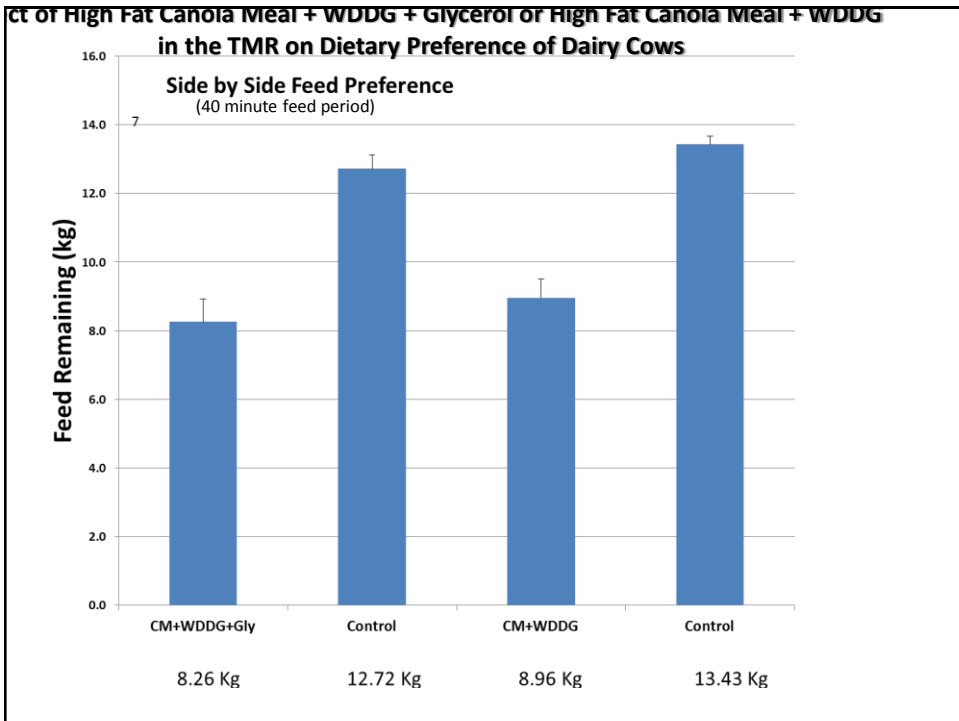
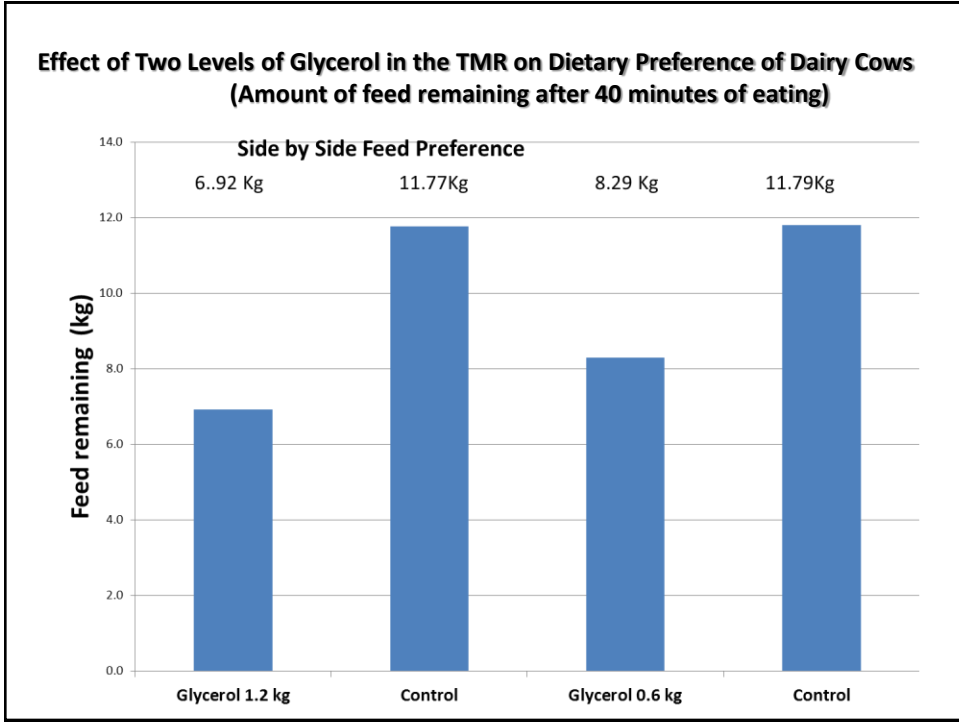
## Transition Cow Trial (Cows 14 days before and 42 days after calving)


- 24 cows, 2<sup>nd</sup> lactation and up, 3 treatments (control, 1 Kg glycerol and 1Kg glycerol + 1 Kg HO meal)
- Fed 2 weeks prior to 42 days after calving
- Excellent Performance :Milk yield at 42 days >55 Kg/cow/day
  - - Milk Fat maintained (3.2 to 3.6)
  - - Body Weight change = acceptable
  - - 8 control cows, 3 had to be treated with glycol for ketosis
- Data collected on blood parameters, milk composition and yield
- TRT effects were significant on statistical analysis
- Summary: Test diets performed, and well accepted by cows.

### Transition Cow Trial (24 cows; 3 TRT groups, Day 21 and 42 after calving)

	Control		1 Kg Gly		Gly+CM	
Item/Day	21	42	21	42	21	42
Cow Kg	726.8	714.5	696.8	690.22	738.0	735.12
Intake Kg	26.76	30.05	25.83	29.9	26.83	30.11
B Plasma						
Glucose	3.1	3.11	3.25	3.2	2.99	3.2
Insulin	0.975	1.3	1.35	3.0	2.44	3.01
NEFA	0.27	0.092	0.13	0.059	0.012	0.074
BHBA	0.56	0.69	0.65	0.72	0.748	0.716
Milk						
Yield Kg	52.76	57.72	52.97	56.08	49.27	51.47
3.5% FCM	51.1	55.47	52.45	56.99	53.79	56.15
ECM Kg	56.26	57.43	55.88	59.92	57.64	59.88
Fat %	3.57	3.26	3.44	3.6	3.94	4.06
Protein%	3.05	2.93	3.06	2.88	3.28	3.1
MUN%	12.76	14.19	12.11	13.16	10.53	13.06







## Take Home Message

- Glycerol is a Preferred high energy and digestible feed.
- Offers traits that other feeds do not have
- Valued competitive feed source
- Glycerol plus some other feeds combined can raise the production bar. (milk yield and health)
- Capture of glycerol potential requires an adjustment in thinking about what you could have and not what you settle for.
- Level of glycerol feeding that appears to be the best is 1.0 Kg to 1.5 Kg / cow/ day. Reason: Because it is a present level that we can accommodate within our present level and type of feeding programs.



## Future direction

- Synergy capture
- WDDGS + Glycerol + Bio Meal
- Result = Product
- Project Led by Saskatchewan Milk Marketing Board and co-supported by North West Bio-fuels and Milligan Bio-Tech.

Thank You for Support From:  
Saskatchewan Canola Development Commission  
CAAP Saskatchewan; ADF Saskatchewan  
Cargill Animal Nutrition; Milligan Bio tech; NW Bio-Fuels  
Saskatchewan Milk Marketing Board

