

Relative Grain Quality-RGQ

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Introduction:

Relative Grain Quality (**RGQ**) is an index of feed grain utilization by lactating dairy cows and is introduced in the Wisconsin Feed Grain Evaluation System. The concept of RGQ was developed based on the success and understanding of Relative Forage Quality (**RFQ**)¹ in forages. Relative Forage Quality has been used to rank forages for sale, inventory purposes or assigning forage to animal production groups according to their forage quality needs. Relative Forage Quality is a ranking index and does not predict animal performance per se. Relative Grain Quality is designed under this same premise; to serve as a ranking tool for feed grains, inventory grains or to assigning grains to animal production groups. The approach used to develop RGQ is a two step process. First an estimate of total tract starch digestibility (**eTTSD**) is made using principle components effecting total tract starch digestibility in lactating dairy cows which are particle size, moisture content and prolamin content. The eTTSD is then converted to the same index scale (approximately 100-200) as RFQ using a simple mathematical formula. Because RFQ and RGQ are expressed on the same relative scale users are not require to learn the nuances of a new index. ¹ Formerly *Relative Feed Value*

RGQ Calculations:

High Moisture Grains: (if moisture > 22.5 %)

eTTSD,% Starch = ((99.72+(-.00282*MPS,um))+((5.97-Prolamin,% of Starch)*(0.86))
Where Prolamin,% Starch =

Corn Feed Grains Analytical result of Larson and Hoffman, 2008

Small Grains (CP, %DM*0.3)/(Starch,%DM/100) Lasztity, 1984.

Milo/Sorghum (CP, %DM*0.6)/(Starch,%DM/100) Lasztity, 1984.

Dry Grains: (if moisture < 22.5 %)

eTTSD,% Starch = ((97.67+(-.00514*MPS,um))+((5.97-Prolamin,% of Starch)*(0.86))
Where Prolamin,% Starch =

Corn Feed Grains Analytical result of Larson and Hoffman, 2008

Small Grains (CP, %DM*0.3)/(Starch,%DM/100) Lasztity, 1984.

Milo/Sorghum (CP, %DM*0.6)/(Starch,%DM/100) Lasztity, 1984.

Steam Rolled/Flaked Grains:

eTTSD, % Starch = 78+(DSA, % Starch/1.5*0.314)

Note: Degree of Starch Access (DSA) as determined by Blasel et al., (2006) is divided by 1.5 to approximate starch hydrolysis in vivo starch digestibility relationships of Yu et al., (1998). Mean particle size (MPS) as determined by Baker and Herrman, (2002) and starch as determined by Ehrman, 1996.

Relative Grain Quality (RGQ) $RGQ = (0.223 * eTTSD^2) + (-34.42 * eTTSD) + 1421$

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 Date

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UW-Feed Grain Evaluation System

Grain Type
 Dry or HM Corn

x

 Small Grain

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 Sorghum Milo

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 Steam Flaked Grain

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Comments
 Example High Moisture Grain

Lab Number

1

 Sample Description

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Item	Abbrev	Unit	Result	Method ¹
Dry Matter	DM	% as fed	70.0	WC
Moisture		% as fed	30.0	C
Protein Fractions				
Crude Protein	CP	% of DM	9.1	WC
Prolamin Protein		% of DM	2.3	WC
Prolamin Protein		% of Starch	3.3	WC
Fiber Fractions				
Neutral Detergent Fiber	aNDF	% of DM	8.4	WC
Starch				
Starch		% of DM	68.9	WC
Mean Particle Size	MPS	microns	2000	WC
Processing Classification			Med-Coarse Grind	
Relative Grain Quality	RGQ		174	C
Carbohydrates and Fats				
Non Fiber Carbohydrate	NFC	% of DM	76.3	C
Nonstarch NFC		% of DM	7.4	C
Fat		% of DM	4.2	WC

Energy Calculations:				
Total Digestible Nutrients, 1X	TDN	% of DM	89.9	C
Net Energy Lactation, 3X	NE _L	Mcals/lb	0.91	C
Net Energy Maintenance	NE _M	Mcals/lb	0.98	C
Net Energy Gain	NE _G	Mcals/lb	0.67	C
Metabolizable Energy, 3X	ME	Mcals/lb	1.42	C

Macro Minerals, % of DM			Micro Minerals, % of DM		
Phosphorus	P	WC	Iron	Fe	WC
Calcium	Ca	WC	Manganese	Mn	WC
Potassium	K	WC	Zinc	Zn	WC
Magnesium	Mg	WC	Copper	Cu	WC
Sodium	Na	WC			
Chloride	Cl	WC	Ash	2.0	WC
Sulfur	S	WC			

¹ WC = wet chemistry NR = not requested C = calculated
 NIR = near infrared spectroscopy NA = not available

Figure 2. An example report for the UW-Feed Grain Evaluation System.

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