

# Nutrient digestibility of 4 varieties of triticale compared to CPS wheat for broilers

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Abstract 212

# A bit about triticale...

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**Wheat**  
(*Triticum spp.*)

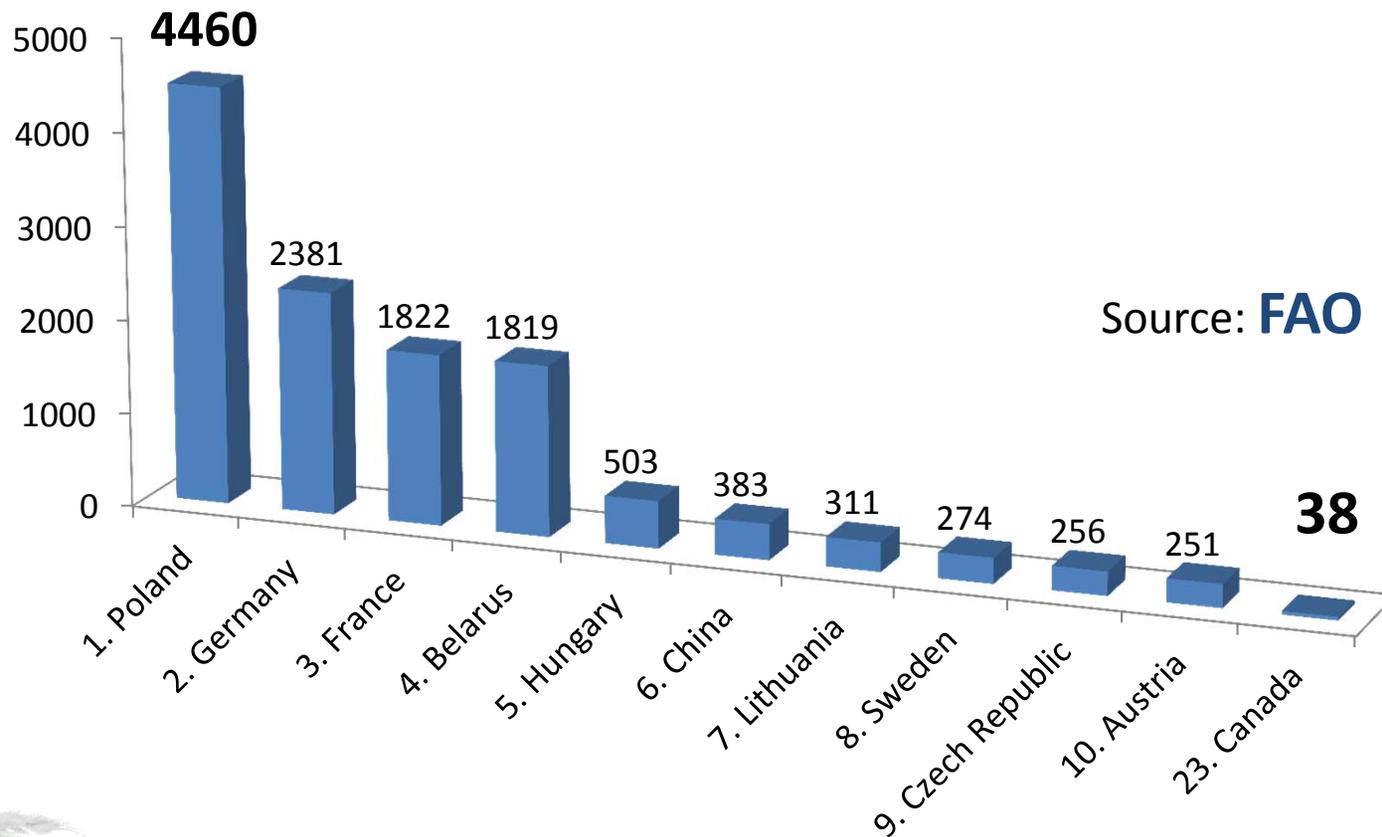
**Rye**  
(*Secale cereale*)

**Triticale**  
(x *Triticosecale*)



# Global triticale production rankings

000's of MT



Source: **FAO**



# A bit more about triticale...

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- **Triticale has several agronomic properties that make it as good or better than wheat:**
  1. **Lower input requirements**
  2. **Better disease resistance**
  3. **Better drought tolerance**
  4. **Tolerates a wider range of soil conditions**
  5. **Higher yields**



# A bit more about triticales...

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# Why the interest in triticale?

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- **Canadian Triticale Biorefinery Initiative**
  - 10-yr R & D program to develop triticale as a dedicated bio-industrial crop in Canada
  - Growth potential as an alternative grain
  - Alberta accounts for 80% of Canadian production



# Triticale as monogastric feedstuff

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- **Considerable experience feeding triticale to pigs and cattle in North America**
- **Limited information on feed value of modern North American varieties to poultry**
  - **Much more experience in Australia and Europe**
  - **Anecdotal evidence from producers in southern Alberta suggest equal value to CPS wheat**



# Triticale as monogastric feedstuff

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- **Korver et al. (2004)**
  - **Compared the economics of feeding triticale vs. wheat to broilers**
  - **Based on their results suggested that triticale needed to be 95% of the price of wheat minus 18\$ per tonne to balance out reduced performance**

- **Also concluded:** triticale diets, however, it is unlikely to compensate for the relatively large increase in costs of production using triticale diets at this time. Further work on improvements in feeding characteristics through plant breeding and increased knowledge of the feeding of triticale to poultry may increase the economic value of this grain relative to wheat.

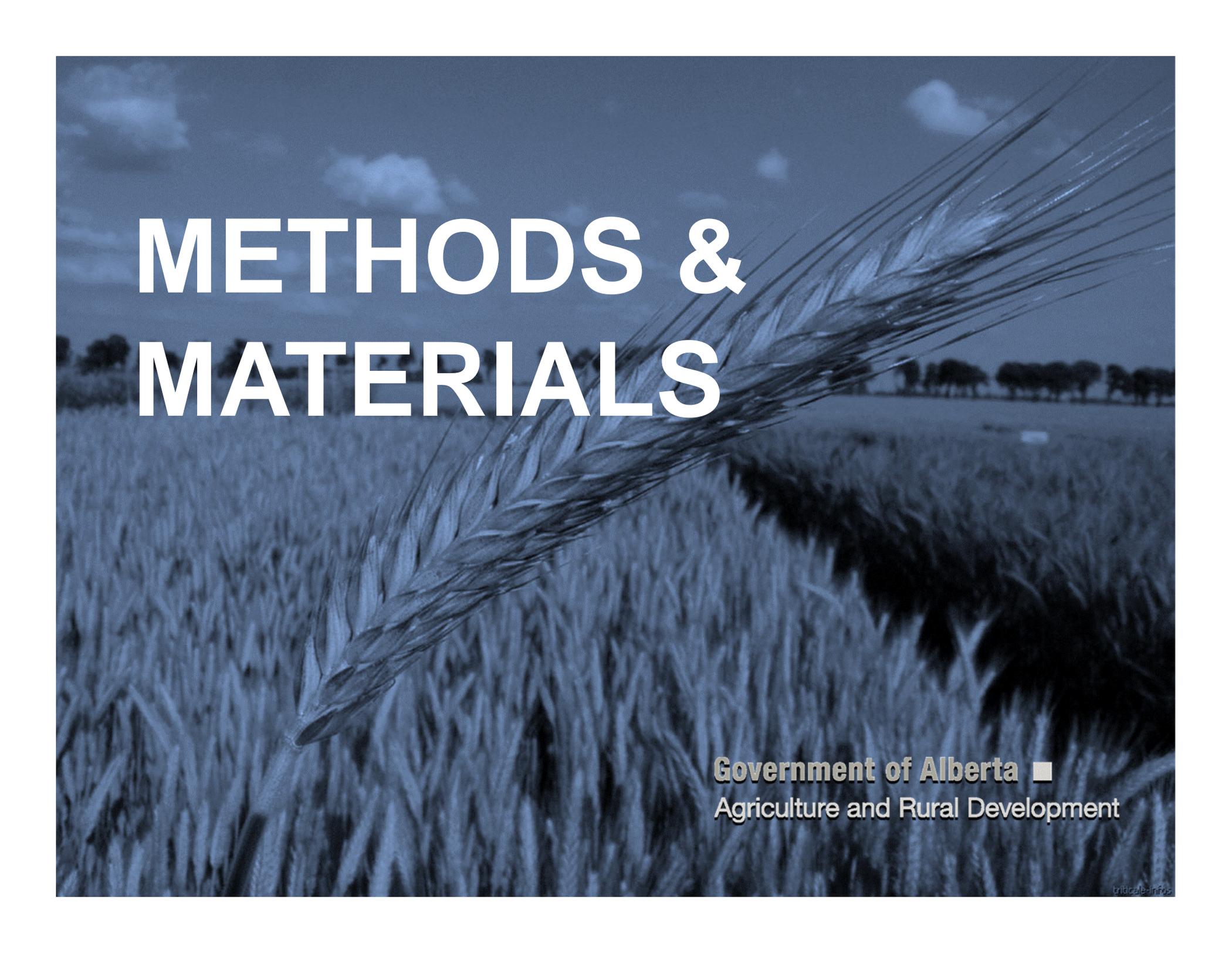


# Our objective

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**To compare nutrient digestibility among 4 modern varieties of spring triticale and two samples of mixed-source Canadian Prairie Spring (CPS) wheat**





# METHODS & MATERIALS

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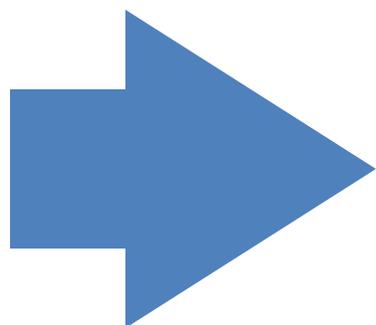
# Our approach



CPS wheat  
(2 samples)



Triticales:  
'Bunker'  
'Alta'  
'Tyndal'  
'Pronghorn'



Ingredient	% inclusion
Test grain	91.58
Canola oil	3.50
Dicalcium phosphate	1.68
Limestone	1.29
Vit/min premix	0.50
Choline chloride	0.50
Chromic oxide	0.50
Salt	0.40
Antibiotic	0.05



**Table 1.** Analyzed nutrient content of 4 samples of spring triticale and 2 mixed-source samples of Canadian Prairie Spring wheat

	<b>Alta</b>	<b>Bunker</b>	<b>Pronghorn</b>	<b>Tyndal</b>	<b>CPS 1</b>	<b>CPS 2</b>
<b>DM</b>	90.46	90.44	90.29	90.43	87.78	88.82
<b>CP</b>	13.49	16.70	13.56	14.26	13.79	12.77
<b>Crude Fiber</b>	2.35	2.44	2.03	2.49	2.12	1.97
<b>ADF</b>	3.17	3.64	2.83	3.35	2.89	2.44
<b>NDF</b>	17.82	30.09	11.74	11.82	10.47	9.45
<b>Ca</b>	0.04	0.03	0.03	0.04	0.11	1.23
<b>P</b>	0.22	0.37	0.28	0.38	0.34	0.82
<b>Lys</b>	0.40	0.54	0.46	0.48	0.42	0.36
<b>Met</b>	0.19	0.26	0.22	0.22	0.23	0.19
<b>Met + Cys</b>	0.47	0.58	0.51	0.53	0.53	0.44
<b>Thr</b>	0.38	0.49	0.42	0.42	0.40	0.37
<b>Trp</b>	0.16	0.19	0.15	0.15	0.17	0.15
<b>Arg</b>	0.61	0.82	0.68	0.71	0.64	0.58



# Our approach (*cont'd*)



d0

Commercial starter diet



d15

Test diets



d22



# Experimental design

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- **Cage (13 birds/pen) = experimental unit**
  - Digesta and excreta were pooled to produce one sample of each per pen
- **Randomized complete block design**
  - Each treatment appeared once in each of 6 blocks for 6 replicate cages per treatment



# Measurements

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- **Feed disappearance measured over the experimental period**
- **Body weight on d 14 and d 21**
- **Diets, ingredients, digesta and excreta assayed for DM, Cr, CP and GE, P and Ca**
  - **Full AA profile also developed for diets and digesta**
  - **ADF, NDF, CF and EE for diets**



# Statistical analysis

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- **Nutrient digestibility coefficients compared using PROC MIXED of SAS (v 9.2)**
  - Main effect = test grain
  - Random term = block
  - Covariates tested = ADFI
  - **Preplanned contrasts:**
    - *within triticale varieties*
    - *triticale vs. wheat*



# RESULTS



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**Table 2.** Nutrient digestibility of 4 samples of spring triticale and 2 mixed-source samples of Canadian Prairie Spring wheat

	ALTA	TYND	PRNG	BUNK	CPS 1	CPS 2	Trit vs. W
<b>ATTD GE</b>	72.89 <sup>a</sup>	69.02 <sup>a</sup>	73.27 <sup>a</sup>	73.46 <sup>a</sup>	56.28 <sup>b</sup>	72.22 <sup>a</sup>	<b>0.0005</b>
<b>AID CP</b>	79.90 <sup>a</sup>	84.32 <sup>a</sup>	83.22 <sup>a</sup>	82.45 <sup>a</sup>	67.89 <sup>b</sup>	81.39 <sup>a</sup>	<b>&lt; 0.0001</b>
<b>AID Lys</b>	76.44 <sup>bc</sup>	82.85 <sup>a</sup>	81.95 <sup>ab</sup>	80.30 <sup>abc</sup>	63.63 <sup>d</sup>	74.77 <sup>c</sup>	<b>&lt; 0.0001</b>
<b>AID Met</b>	85.10 <sup>a</sup>	90.28 <sup>a</sup>	87.50 <sup>a</sup>	88.39 <sup>a</sup>	74.26 <sup>b</sup>	87.78 <sup>a</sup>	<b>0.0009</b>
<b>AID Met + Cys</b>	81.90 <sup>a</sup>	86.37 <sup>a</sup>	84.29 <sup>a</sup>	84.73 <sup>a</sup>	68.86 <sup>b</sup>	86.11 <sup>a</sup>	<b>0.0031</b>
<b>AID Thr</b>	69.85 <sup>b</sup>	77.24 <sup>a</sup>	75.09 <sup>ab</sup>	73.04 <sup>ab</sup>	56.71 <sup>c</sup>	73.61 <sup>ab</sup>	<b>0.0005</b>
<b>AID Trp</b>	88.10 <sup>b</sup>	86.93 <sup>bc</sup>	86.45 <sup>bc</sup>	86.75 <sup>bc</sup>	84.21 <sup>c</sup>	91.82 <sup>a</sup>	0.3825
<b>AID Arg</b>	86.95 <sup>b</sup>	91.17 <sup>a</sup>	89.61 <sup>ab</sup>	89.31 <sup>ab</sup>	74.78 <sup>c</sup>	86.70 <sup>b</sup>	<b>&lt; 0.0001</b>
<b>AID Total AA</b>	84.10 <sup>a</sup>	88.00 <sup>a</sup>	86.66 <sup>a</sup>	86.46 <sup>a</sup>	73.07 <sup>b</sup>	86.51 <sup>a</sup>	<b>0.0004</b>



**Table 3.** Digestible nutrient content of 4 samples of spring triticale and 2 mixed-source samples of Canadian Prairie Spring wheat

	ALTA	TYND	PRNG	BUNK	CPS 1	CPS 2	Trit vs. W
AME, kcal/kg	2975 <sup>ab</sup>	2831 <sup>b</sup>	2981 <sup>ab</sup>	2988 <sup>ab</sup>	2191 <sup>c</sup>	3178 <sup>a</sup>	<b>0.0005</b>
Dig Crude Protein	10.78 <sup>cd</sup>	14.08 <sup>a</sup>	11.28 <sup>bc</sup>	11.76 <sup>b</sup>	9.36 <sup>e</sup>	10.40 <sup>d</sup>	<b>&lt; 0.0001</b>
Dig Lysine	0.31 <sup>c</sup>	0.45 <sup>a</sup>	0.38 <sup>b</sup>	0.39 <sup>b</sup>	0.27 <sup>d</sup>	0.27 <sup>d</sup>	<b>&lt; 0.0001</b>
Dig Methionine	0.16 <sup>c</sup>	0.24 <sup>a</sup>	0.19 <sup>b</sup>	0.19 <sup>b</sup>	0.17 <sup>c</sup>	0.17 <sup>c</sup>	<b>0.0009</b>
Dig Met + Cys	0.39 <sup>c</sup>	0.50 <sup>a</sup>	0.43 <sup>b</sup>	0.45 <sup>b</sup>	0.36 <sup>c</sup>	0.38 <sup>c</sup>	<b>0.0031</b>
Dig Threonine	0.27 <sup>c</sup>	0.38 <sup>a</sup>	0.32 <sup>b</sup>	0.31 <sup>b</sup>	0.23 <sup>d</sup>	0.27 <sup>c</sup>	<b>0.0005</b>
Dig Tryptophan	0.14 <sup>b</sup>	0.17 <sup>a</sup>	0.13 <sup>c</sup>	0.13 <sup>c</sup>	0.14 <sup>b</sup>	0.14 <sup>b</sup>	0.3825
Dig Arginine	0.53 <sup>d</sup>	0.75 <sup>a</sup>	0.61 <sup>c</sup>	0.64 <sup>b</sup>	0.48 <sup>f</sup>	0.50 <sup>e</sup>	<b>&lt; 0.0001</b>
Dig Total AA	9.85 <sup>c</sup>	13.11 <sup>a</sup>	11.00 <sup>b</sup>	11.30 <sup>b</sup>	9.59 <sup>c</sup>	10.04 <sup>c</sup>	<b>0.0004</b>



# Conclusions

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- **Nutrients in all 4 varieties of triticale appear to be as digestible as those in CPS wheat**
  - Appeared to be more similarity among triticale samples than between wheat samples
- **Calculated digestible nutrient content suggest that any of these triticale varieties could replace CPS wheat**
  - Differences in nutritive value between spring and winter varieties???



# The triticales-Star Trek connection?

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