# Effects of a 2-step dry fractionation process on nutrient digestibility in wheat DDGS for broilers

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# Opportunities and challenges with feeding wheat DDGS to poultry

## Opportunities

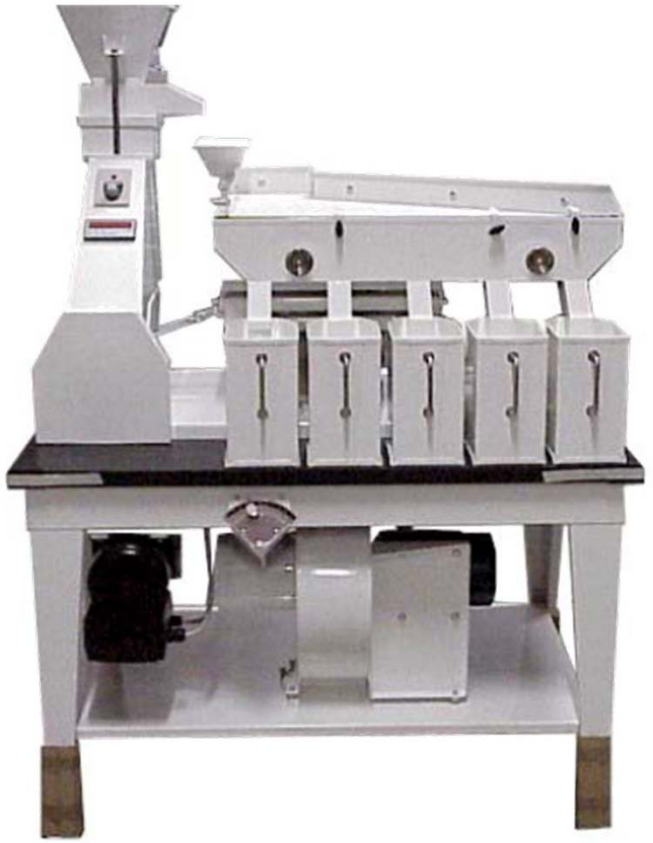
- Cost
- Local availability
- Protein content
- Minerals highly digestible

## Challenges

- Fiber content
- AA balance & digestibility
- Handling issues
- Contamination
- Variation
- Maximum inclusion level(?)

# Say hello to our little friends…

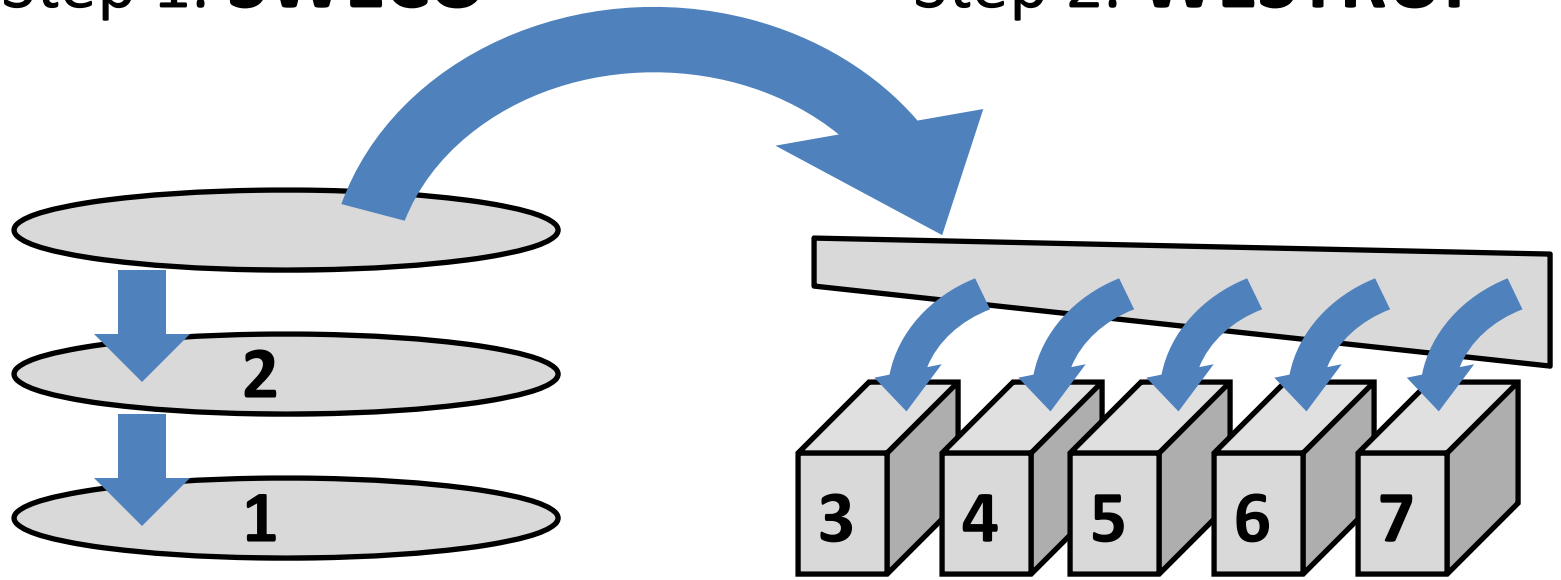
SWECO ZS30 vibro-separator



Westrup LA-K

Step 1. **SWECO**

Step 2. **WESTRUP**




| | A | | B | | C | D | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Yield, % | 22.9 | 3.8 | 9.2 | 20.5 | 30.7 | 32.7 | 5.7 |
| CP, % | 52.7 | 52.1 | 50.0 | 45.1 | 40.5 | 38.2 | 32.1 |
| ADF, % | 12.4 | 10.9 | 13.4 | 14.8 | 17.0 | 18.0 | 21.8 |
| NDF, % | 22.2 | 22.0 | 23.9 | 29.1 | 33.5 | 38.2 | 43.0 |

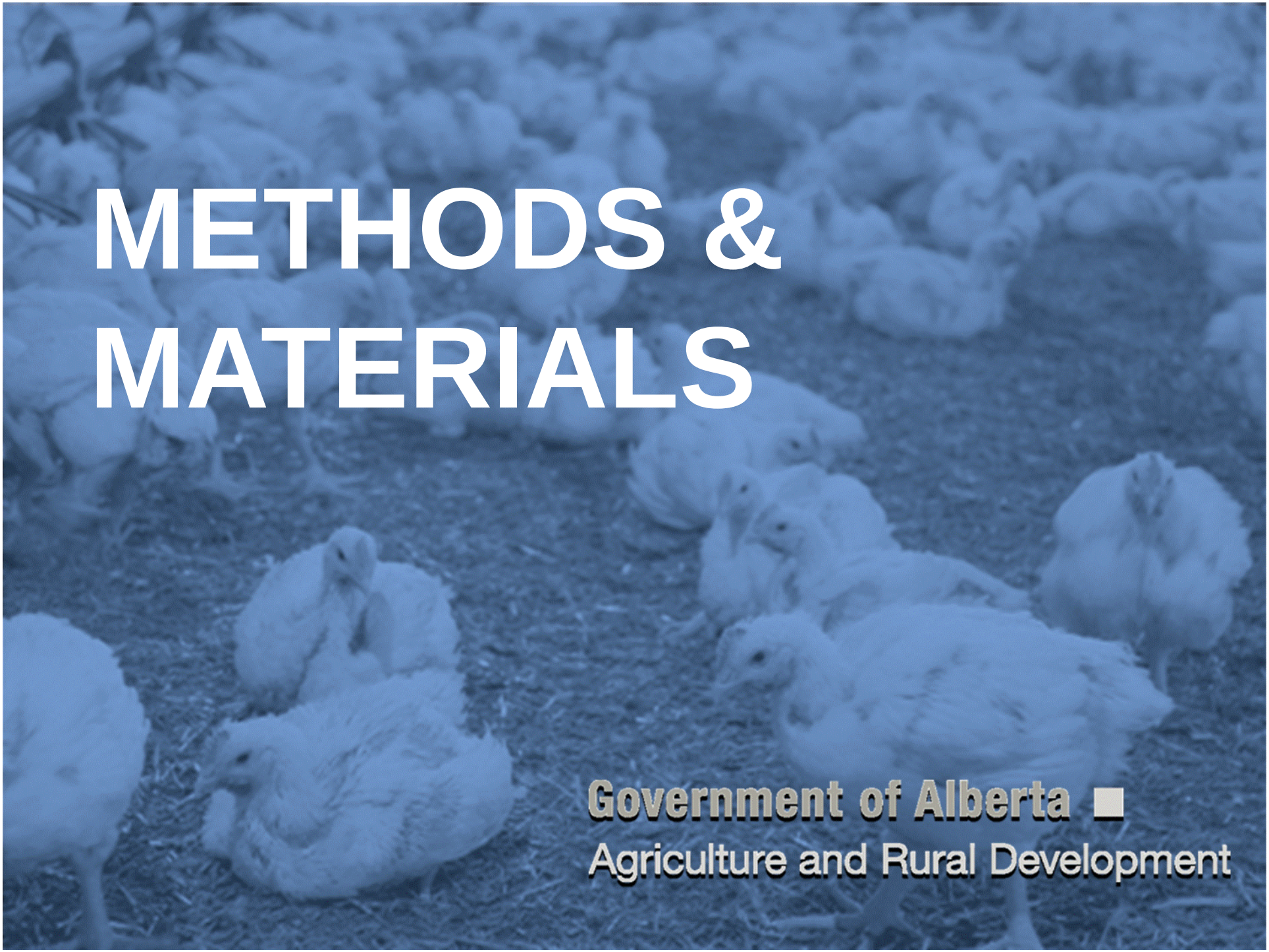
**Table 1**. Analysed nutrient composition of parent stock wheat DDGS and the 4 resulting fractions.

| Nutrient | Wheat DDGS | Fraction 'A' | Fraction 'B' | Fraction 'C' | Fraction 'D' |
|---|---|---|---|---|---|
| **Crude protein, %** | 39.40 | 52.7 | 43.3 | 38.0 | 31.9 |
| **Crude fat, %** | 4.06 | 2.9 | 3.6 | 3.3 | 3.0 |
| **Crude fiber, %** | 5.46 | 5.2 | 8.0 | 10.6 | 13.2 |
| **ADF, %** | 15.18 | 11.0 | 12.4 | 14.1 | 16.7 |
| **NDF, %** | 35.17 | 27.6 | 31.9 | 43.4 | 44.2 |
| **Lysine, %** | 0.85 | 1.04 | 0.92 | 0.82 | 0.63 |
| **Methionine, %** | 0.55 | 0.74 | 0.58 | 0.49 | 0.36 |
| **Threonine, %** | 1.09 | 1.39 | 1.16 | 0.98 | 0.76 |
| **Tryptophan, %** | 0.42 | 0.39 | 0.33 | 0.31 | 0.24 |
| **Arginine, %** | 1.54 | 1.99 | 1.71 | 1.52 | 1.16 |

# Our Objective

**To compare nutrient digestibility between wheat DDGS and 3 of the fractions (A, C & D) produced using our2-step process**

**(i.e., is there any advantage to DDGS fractionation beyond simply increasing nutrient density?)**


METHODS &
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# Our approach

| Ingredient | Basal diet | Test diets |
|---|---|---|
| Wheat | 87.75 | 61.42 |
| Canola oil | 5.00 | 3.50 |
| Test ingredient | - | 30.00 |
| Dicalcium phosphate | 2.75 | 1.92 |
| Limestone | 1.72 | 1.20 |
| Vitamin/mineral premix | 0.71 | 0.50 |
| Choline chloride premix | 0.71 | 0.50 |
| Salt | 0.57 | 0.40 |
| Antibiotic | 0.07 | 0.05 |
| Chromic oxide | 0.71 | 0.50 |

# Our approach (*cont'd*)

Commercial starter diet

Test diets

d0

d15

d22

# Experimental design

- **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

- **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

- **Nutrient digestibility coefficients compared using PROC MIXED of SAS (v 9.2)**
  - **Main effect = test ingredient**
  - **Random term = block**
  - **Covariates tested = ADFI**
  - **Preplanned contrast:**
    - ***DDGS vs. fractions***


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**Table 2.** Nutrient digestibility of wheat DDGS and 3 fractions produced using a 2-step dry fractionation process.

| | Wheat DDGS | Fraction 'A' | Fraction 'C' | Fraction 'D' | SEM | DDGS vs Fractions |
|---|---|---|---|---|---|---|
| ATTD GE, % | 62.66 | 75.08 | 56.75 | 69.04 | 5.20 | 0.4854 |
| AID Lys, % | 73.49 | 67.27 | 69.75 | 77.27 | 5.42 | 0.7318 |
| AID Met, % | 86.17 | 84.64 | 82.83 | 91.04 | 4.74 | 0.9995 |
| AID Met + Cys, % | 83.65 | 79.85 | 78.42 | 86.38 | 5.10 | 0.7166 |
| AID Thr, % | 76.33 | 74.21 | 71.83 | 82.57 | 5.26 | 0.9834 |
| AID Trp, % | 84.98 | 76.72 | 81.23 | 84.75 | 3.56 | 0.3239 |
| AID Arg, % | 85.73 | 82.51 | 81.88 | 88.70 | 2.99 | 0.6809 |
| AID Total AA, % | 85.22 | 81.15 | 80.72 | 86.55 | 4.15 | 0.6058 |

**Table 3.** Digestible nutrient content of wheat DDGS and 3 fractions produced using a 2-step dry fractionation process.

| | Wheat DDGS | Fraction 'A' | Fraction 'C' | Fraction 'D' | SEM | DDGS vs Fractions |
|---|---|---|---|---|---|---|
| AME, kcal/kg | 2862 | 3469 | 2597 | 3121 | 237 | 0.4755 |
| Dig Lys, % | 0.63 | 0.63 | 0.63 | 0.56 | 0.04 | 0.5845 |
| Dig Met, % | 0.49$^{ab}$ | 0.55$^{a}$ | 0.46$^{bc}$ | 0.40$^{c}$ | 0.02 | 0.5138 |
| Dig TSAA, % | 1.07$^{ab}$ | 1.18$^{a}$ | 0.97$^{bc}$ | 0.87$^{c}$ | 0.06 | 0.4003 |
| Dig Thr, % | 0.85 | 0.91 | 0.79 | 0.72 | 0.05 | 0.5417 |
| Dig Trp, % | 0.36$^{a}$ | 0.36$^{a}$ | 0.35$^{a}$ | 0.28$^{b}$ | 0.01 | 0.0541 |
| Dig Arg, % | 1.35$^{a}$ | 1.43$^{a}$ | 1.30$^{a}$ | 1.14$^{b}$ | 0.04 | 0.2699 |
| Dig Total AA, % | 27.44$^{ab}$ | 30.40$^{a}$ | 25.39$^{bc}$ | 21.80$^{c}$ | 1.24 | 0.2903 |

# Conclusions

- **Nutrient digestibility did not differ among wheat DDGS and fractions produced using our 2-step process**
  - **Main effect of fractionation seems to be production of DDGS fractions differing in AA and fiber content**
- **Results may suggest that factors other than fiber content influence AA digestibility in wheat DDGS**

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