PETFOOD FORUM

April 29 - May 1, 2024

EXTRU-TECH INC.

1Solution GROUP
Global Project Solutions Group
Feed/Food Processing

#petfoodforum • www.PetfoodForumEvents.com

Introduction

Will Henry

Research & Development, Lab Director

1SG Project Manager

AS, BS Engineering (KSU)

HACCP, SQF, BSL-2, ALT

25+ Years

Product Development, Process Design,

Project/Product Management, Feeding Trials & Analysis,

Commercial Aspects

Multiple Industries

stock feed, food, pet food, industrial

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WENGER GROUP OWNED BY MAREL

1Solution GROUP EXTRU-TECH marel SOURCE TECHNOLOGY WENGER

Discussion Points

Proteins / Alternative Proteins / Binders

- Animal Based
- Plant Based
- Designed

How do their inclusion affect the….

- extrusion process
- finished product

ALL STATEMENTS FOR EDUCATIONAL PURPOSE

NOT PROMOTIONAL

Animal Proteins

- Beef
- Pork
- Bison
- Buffalo
- Deer
- Elk
- Rabbit
- Chicken
- Quail
- Pheasant
- Duck
- Turkey
- Antelope
- Salmon
- Whitefish
- Tuna
- Menhaden
- Trout
- Haddock
- Kangaroo
- Lamb
- Wild Boar
- Crickets
- BSF
- Polychaetae

Raw Muscle & Raw Whole Organ

Dehydrated Muscle/Organ

Meat or Meat/Bone Meals or Stabilized Slurry

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Raw Muscle & Organ

Proximate Analysis (Protein, Fat, Fiber, Moisture, Ash)

- Protein – Functional Protein - Binding
- Fat – Lubricant & Nutrition
- Moisture – Lubricant & Yield
- Fiber & Ash – Nutritional

Muscle VS Organ

- Binding – Organ
- Conveying/Instrumentation – Muscle
- Yield - Organ

Heated VS Cold

Depends – Process Design & Food Safety

CCP at Preconditioning - ~187 °

- Steam Load Increased if Cold
- Adds to the moisture load

CCP at Die

- Can manage lower temperatures at preconditioner
- Allows for usage as functional binder

Dehydrated & Dried

Proximate Analysis (Protein, Fat, Fiber, Moisture, Ash)

- Nutritional Only – Protein Concentrate

Hygroscopic

- Compliments ‘high’ fresh meat diets
- Moisture & Viscosity
- Bone – Watch Nutritional
  - Potential issue with food categories
  - Enhances Moisture & Viscosity

Stabilized ‘Slurry’

Proximate Analysis (Protein, Fat, Fiber, Moisture, Ash)

- Nutritional Only

Consistency is Paramount

Palatability Affect *

Easier/Simpler Process Design

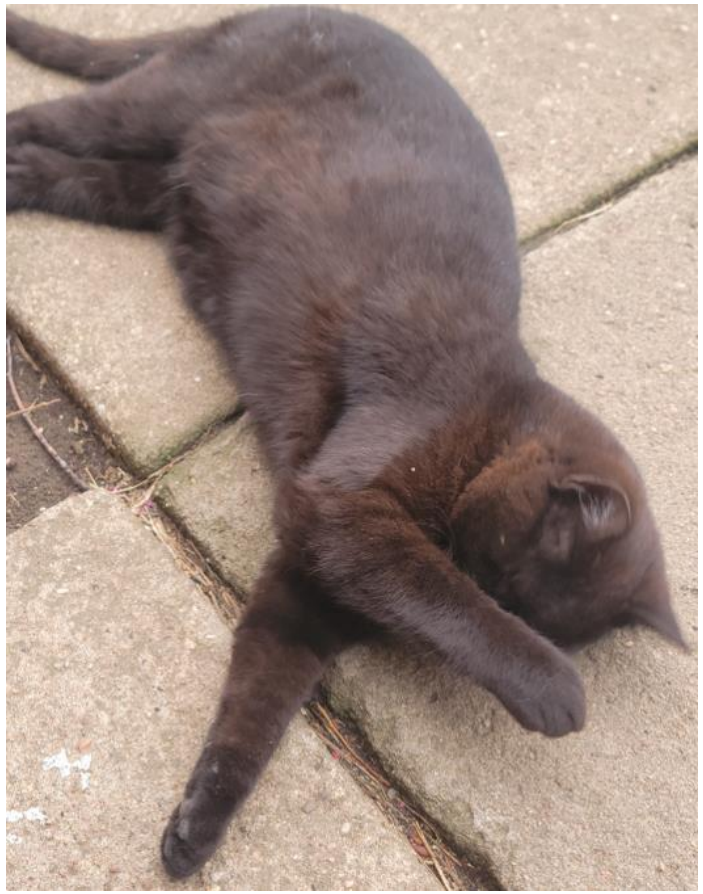
Inventory Risk Mitigation *

Fat Considerations

All Animal Fats are created equal (in the eye of the extruder)

Fat is a lubricant – Pay Attention

- Decrease rate to maintain energy inputs
- Change mechanical configuration
- Change Die Design for expansion
- Adjust conveyance for fragility
- Higher starch gelatinization – TE Conduction



What is the Problem

Rarely (if ever) will the following proteins directly replace animal protein

Caveat – Vegetarian, Vegan, Sustainability

Economics

Fines issue – Be sure to determine where

Durability / Hardness

Binding – in terms of improving fragility

Texture – surface feel/appearance

Yield

Barrel / Preconditioning surging

Raw Muscle & Organ - Yield

	All Dry	20%	40%
Yield Loss (%)	5.36	18.84	33.57%
PC Eff. RM Cost ($)	901.10	1,391.46	1,940.30
Final Eff. RM Cost ($/#)	0.657	1.00	1.275

Fines

‘Creation at the Die’

Improve product durability (mechanical issues ruled out)

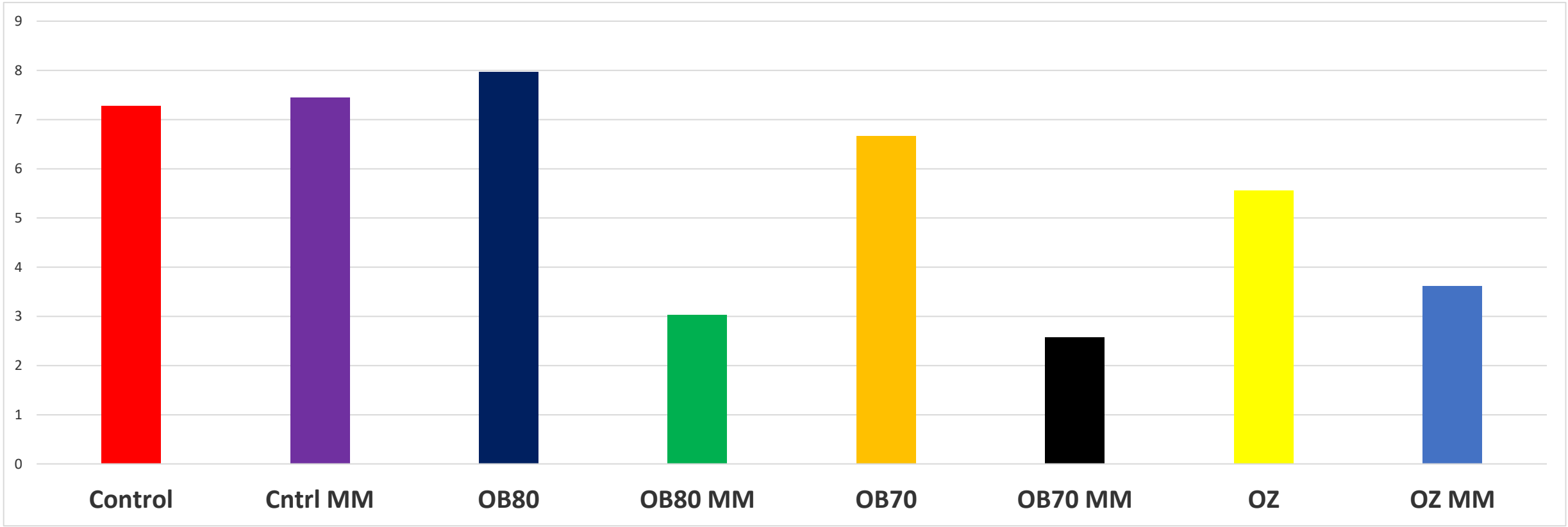
Egg, pre-gelled starches, transglutaminase, plasma

‘Creation Post Extrusion’

Gelatin, Egg

Always check your water curve first.

Egg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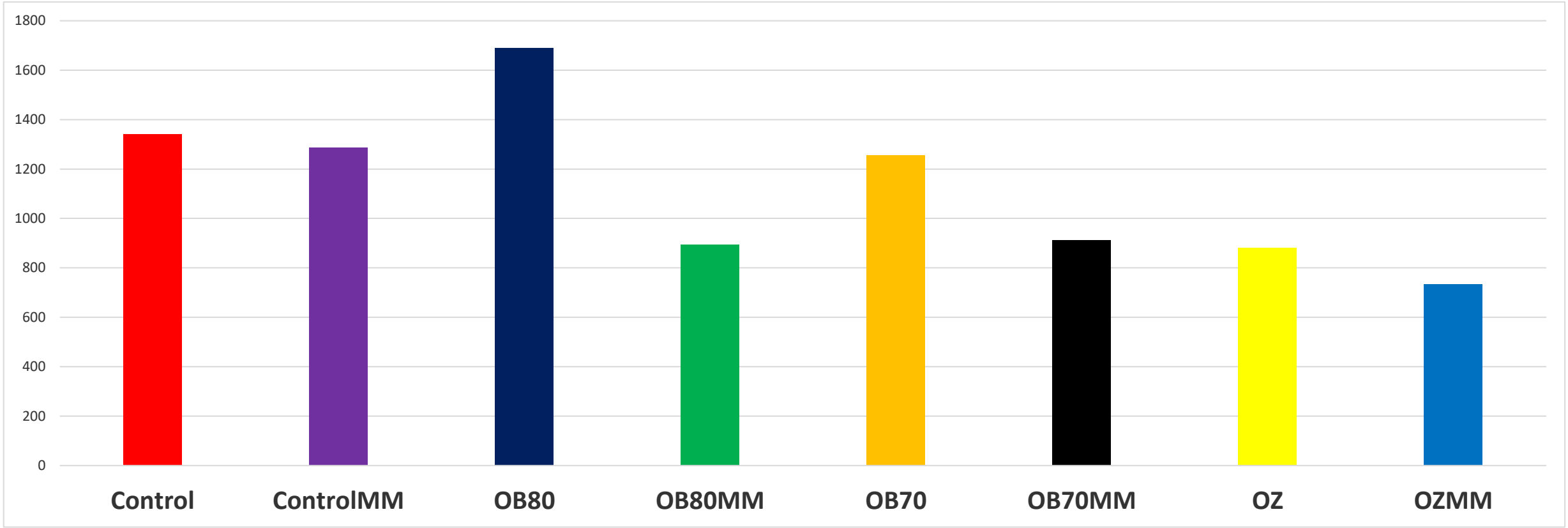
Egg



Durability / Hardness

Process Survival OR Product Specification

Again, rule out mechanical deficiency

Pneumatic Air Velocity & Path

90◦ Best – NTE180 ◦

Worn components – Coater / Airlocks

Process Survival – Gelatin, Starches, Fiber (lignin), Peptides

Binding

Again, Ask Why?

For a grain-free diet, can not use cereal-grain starches

For low-carb, can not use any starches

Egg, Gelatin, Plasma, TGs, Gums, Fiber, Whey

Vegan / Vegetarian – may exclude gelatins, plasma, eggs

Gums, Fiber, Nano-Fibrils (Fiber)

Specialty Meat – Check Protein GAs

Starches, Gums, Fibers, Whey, Casein, Caseinate

Don’t Forget Texture & Yield

Surging

Again, rule out mechanical issues

Plasma – Dental Stick Surprise

Fibers – Aggregate – Decrease Velocity

Egg, Starches – Hot Set - Viscosity

Questions

Will Henry
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