

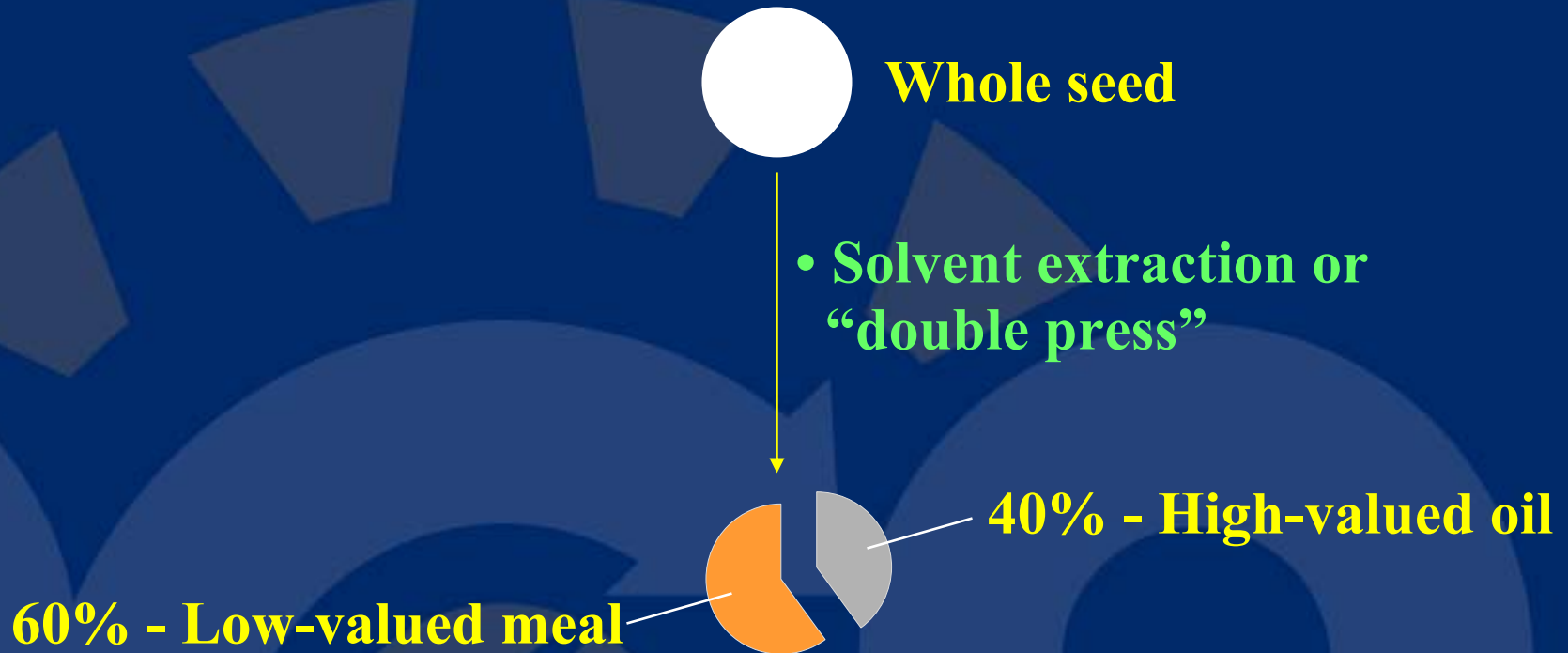


The Production and Use of High-Valued Canola Protein Concentrates

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Conventional Canola Processing



Canola Meal Composition



	Canola Meal	Soybean Meal
Protein (%)	36	48
Crude Fiber (%)	12	3.9
Methionine		
(% of meal)	0.74	0.67
(% of protein)	2.05	1.40
(% digest. - swine)	82	86
Lysine		
(% of meal)	2.08	3.02
(% of protein)	5.78	6.29
(% digest. - swine)	74	85
Phytate (%)	3.1	1.7

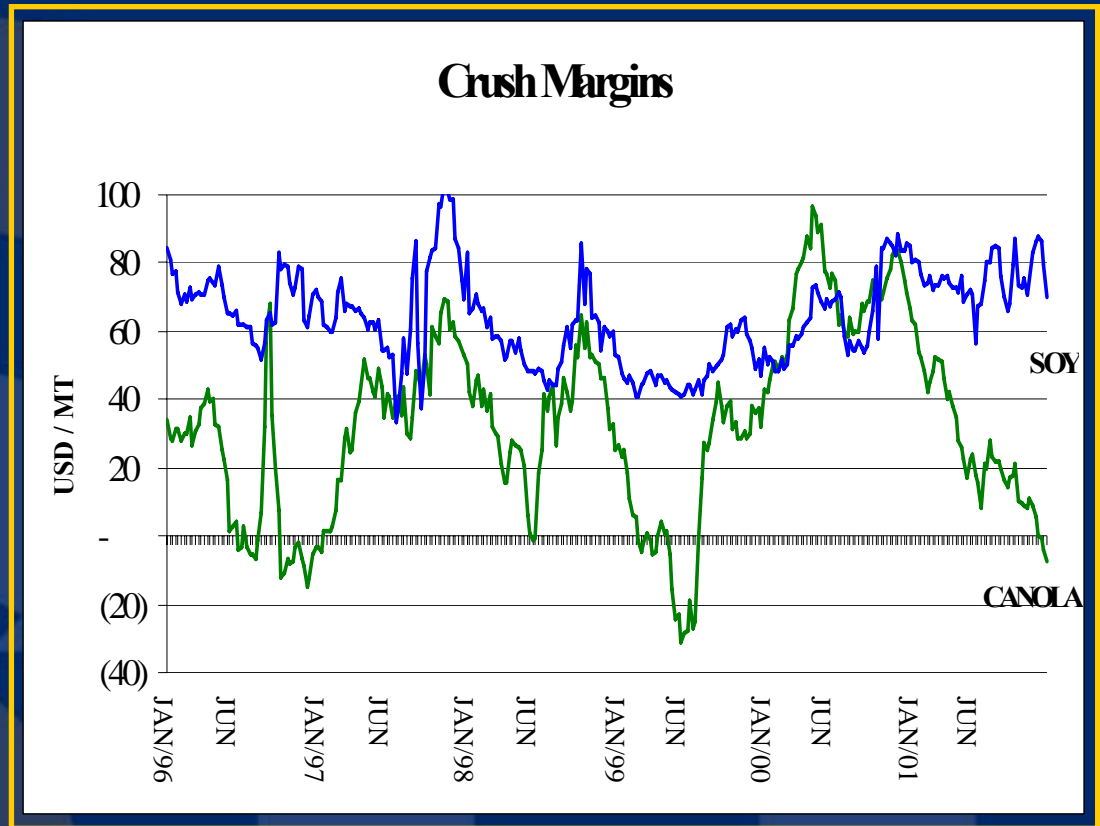
Canola protein amino acid balance – very good

Canola meal value is diminished by high fiber and phytate

Canola meal trades ~ 60% of the value of soybean meal

Canola Crush Margins

- Soybeans
 - Valued meal + oil
 - Additional protein and other products
 - Many sources of demand
 - Consistent profitability
- Canola
 - Valued oil + low valued meal
 - Volatile margins



Canola needs new and higher valued product lines

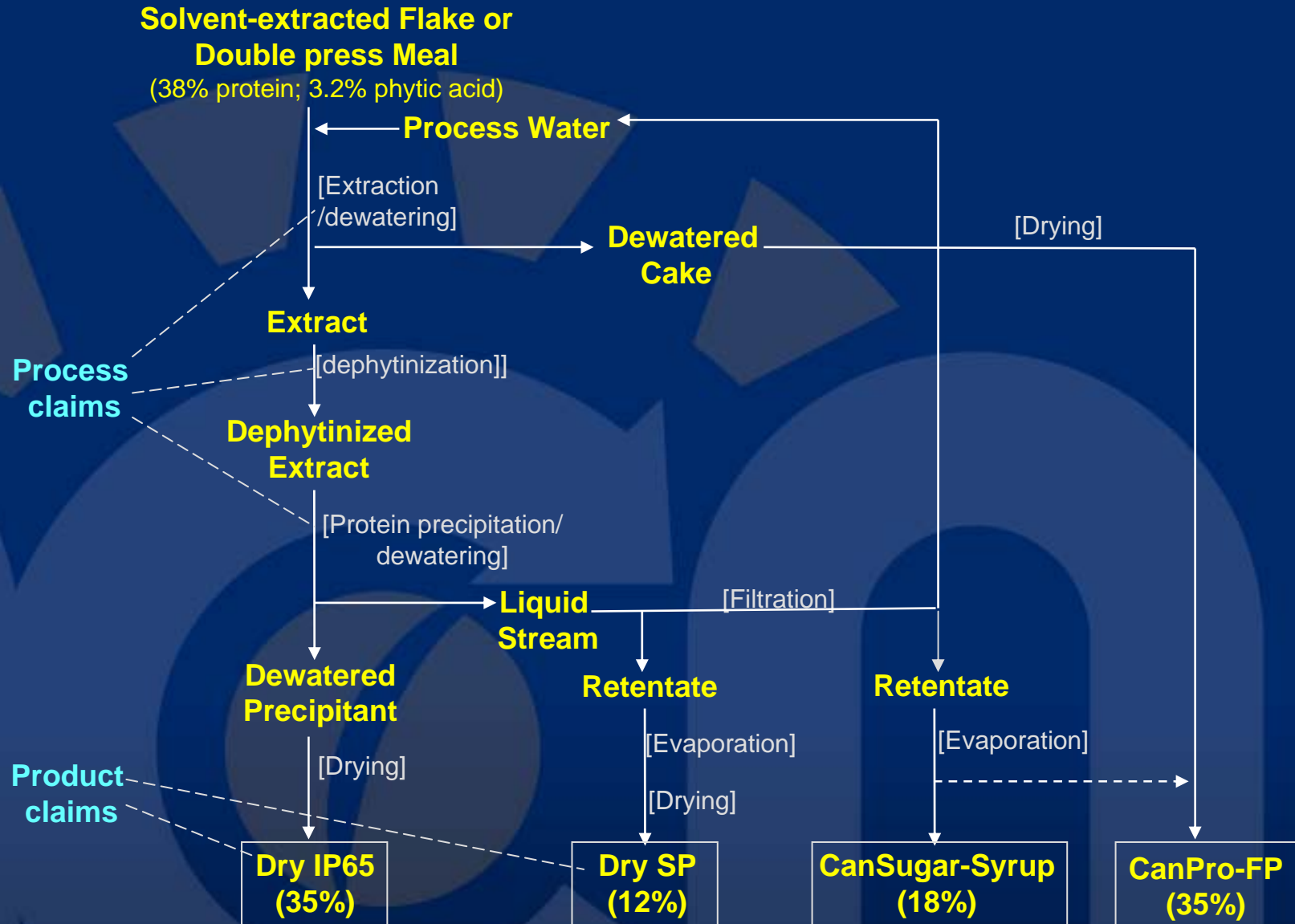
Objective to the MCN Process



To “unlock” the potential of canola protein through fractionation and generation of high-valued protein concentrates.

- **Products are targeted for use as animal feed ingredients**
- **Products must have considerable feeding value as a plant-based alternative to fishmeal, and other animal-based protein sources**
- **Process must be cost-effective**

Overview of MCN Process



Target High End Animal Nutrition

- Insoluble protein
(65% protein)



- Alternative to:
 - Fish meal
 - Aqua feed
 - Swine, poultry
 - Animal based proteins
 - Soy protein concentrates

- Soluble protein
(60% protein)



- Alternative to:
 - Dairy proteins
 - Hydrolized plant proteins
- Calf milk replacers

Nutrient Content of Protein Sources

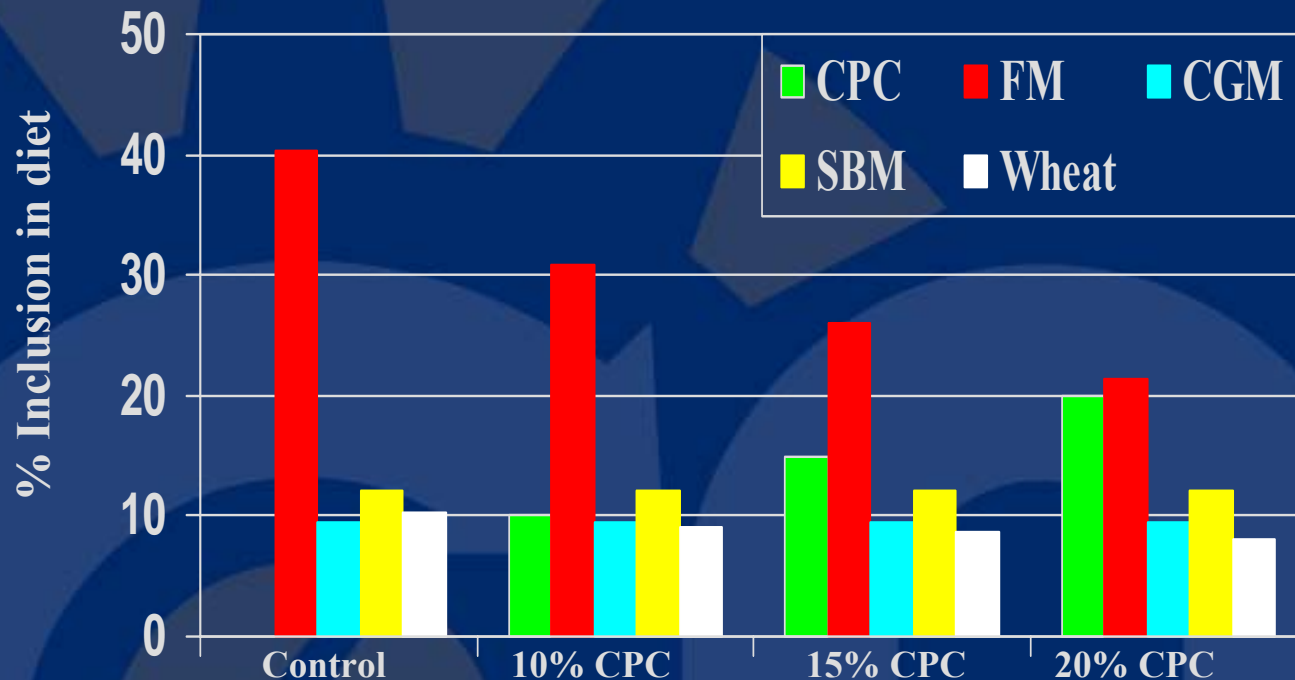
	IP65	FM	CGM	SBM
Dry Matter	95.3	91.8	90.8	88.7
Crude Protein	66.7	68.2	63.1	47.0
Fat	0.73	7.93	0.96	1.33
Ash	10.70	16.48	1.42	5.75
Crude Fiber	3.64	0.00	0.52	2.15
Amino Acids				
Arginine	4.16	4.01	1.93	3.48
Lysine	3.48	5.46	1.02	3.02
Methionine	1.55	2.04	1.43	0.67
Threonine	2.78	3.02	2.08	1.85
Minerals				
Ca	0.95	2.40	0.05	0.34
P (% available)	1.40(100)	1.76(100)	0.44(15)	0.69(23)
Mg	0.69	0.18	0.08	0.30
Na	0.86	0.61	0.02	0.02
Antinutritional Factors				
Phytic acid	0	0	1.2	1.7
Glucosinolates (umole/g)	3.44			
Antigenic potential	↓	↓	↑	↑

Nutrient Digestibility of Protein Sources in Rainbow Trout



	IP	FM	CGM	SBM
Crude protein	89.9^a	89.6^a	91.1^a	95.0
Amino Acids⁴				
Arginine	95.4^a	93.2^b	93.2^b	96.8
Lysine	93.5^b	96.3^a	89.8^c	97.4
Methionine	95.4^a	94.9^a	95.3^a	98.4
Threonine	89.3^b	93.2^a	90.2^b	96.0
Isoleucine	92.1^a	94.1^a	91.7^a	95.8
Leucine	90.4^c	94.4^a	92.5^b	94.6
Histidine	92.9^b	94.4^a	91.8^b	98.4
Phenylalanine	86.9^b	88.9^b	91.2^a	99.8
Valine	92.8^{ab}	94.1^a	91.9^b	95.6

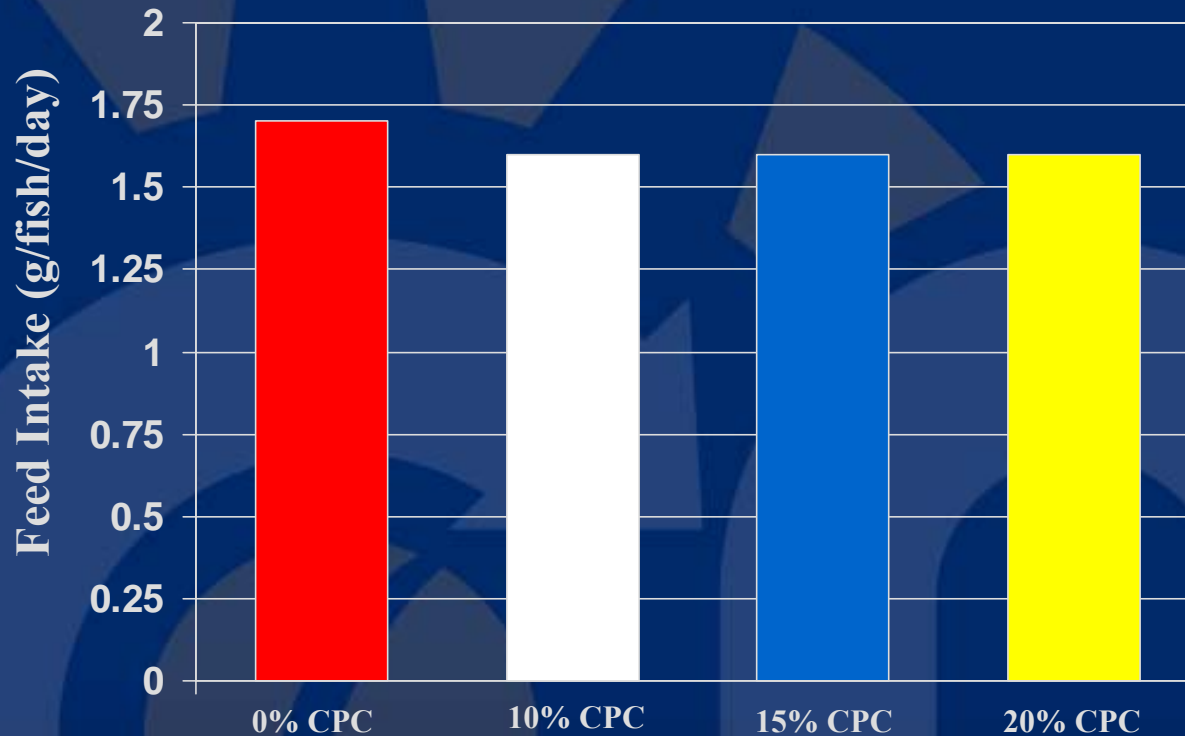
Replacement of Fishmeal with CPC in Diets Fed to Atlantic Salmon



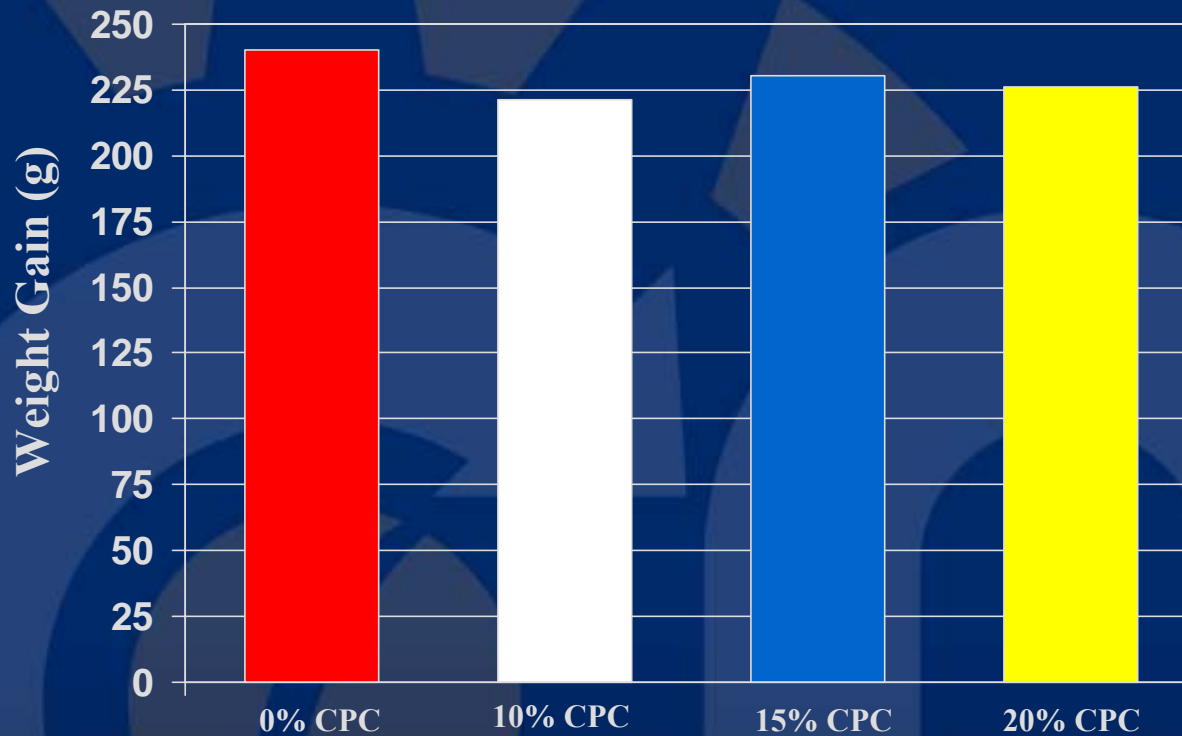
•Protein digestibility = 89.1% fishmeal; 90.5% CPC

•Dietary crude protein 44.0-45.5; digestible protein/energy ratio = 18.1-18.8 g/MJ

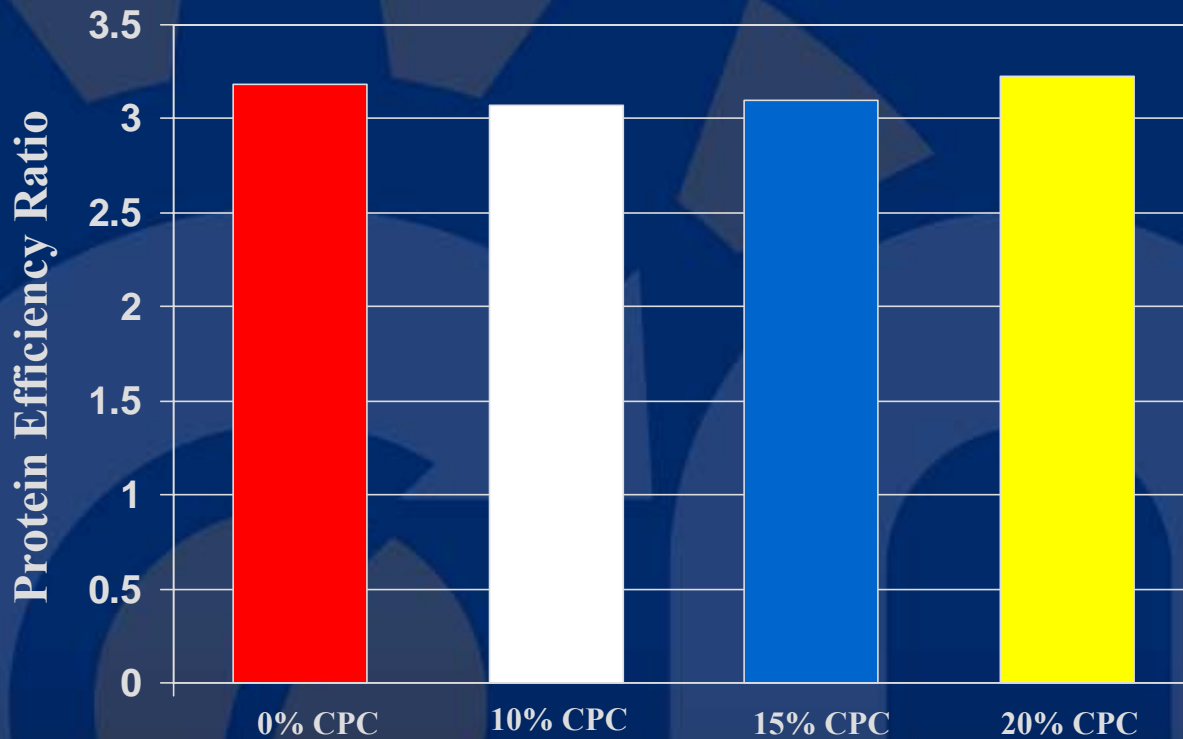
Replacement of Fishmeal with CPC in Diets Fed to Atlantic Salmon (105 Day Feeding Trial)



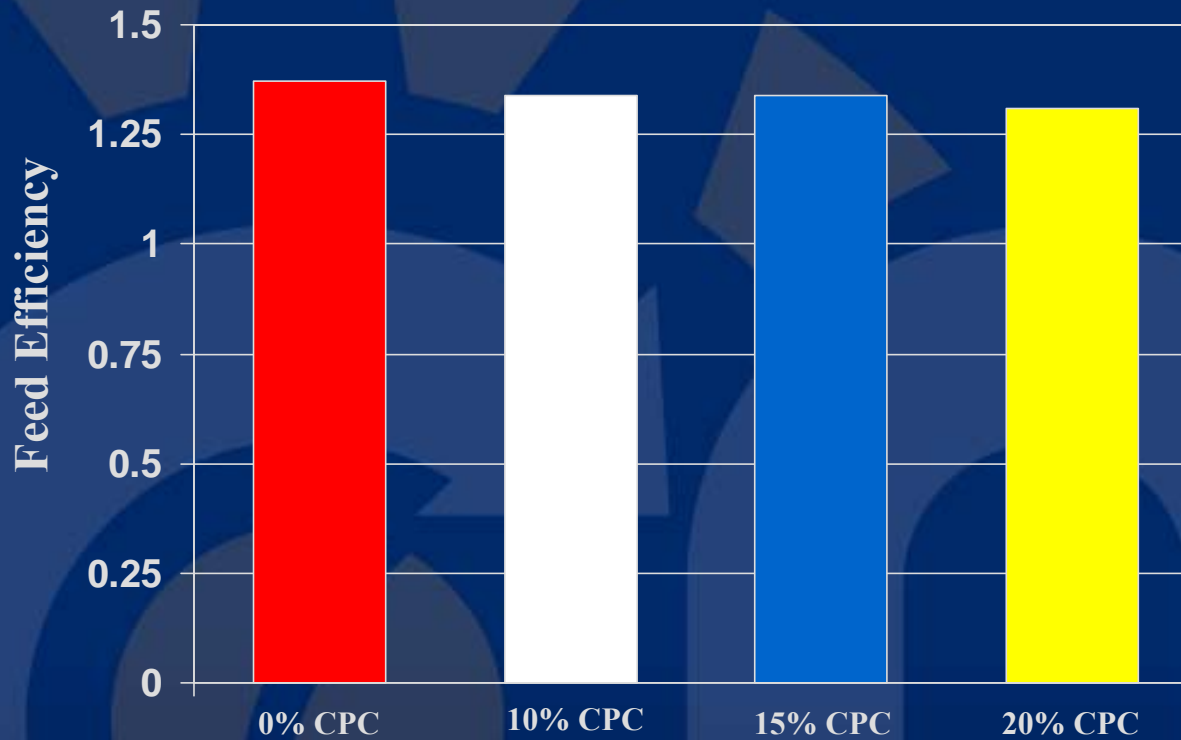
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Replacement of Fishmeal with CPC Hematology and Innate Immunity of Atlantic Salmon



- **No differences in the following hematological parameters in comparing fish on control and CPC test diets**
 - Erythrocyte nos.,
 - Hemoglobin (g/dL),
 - MCV (Mean Erythrocyte Volume)
 - MEHC (Mean Erythrocyte Hemoglobin Content – Hb/100 ml packed cells)
 - MEH (Mean Erythrocyte Hemoglobin – Hb/individual cell)
 - Total leucocytes
 - Lymphocytes Nos
 - Thrombocytes Nos.
 - Neutrophil Nos.
 - Monocyte Nos.
- **No differences in innate immunity parameters in comparing fish on control and CPC test diets**
 - HKL (Head Kidney Leucocyte) Respiratory Burst Activity (% nitroblue tetrazolium positive)
 - Plasma Lysozyme Activity (hen egg white lysozyme U/ml)

Replacement of Fishmeal with CPC in Diets Fed to Atlantic Salmon

(105 Day Feeding Trial)

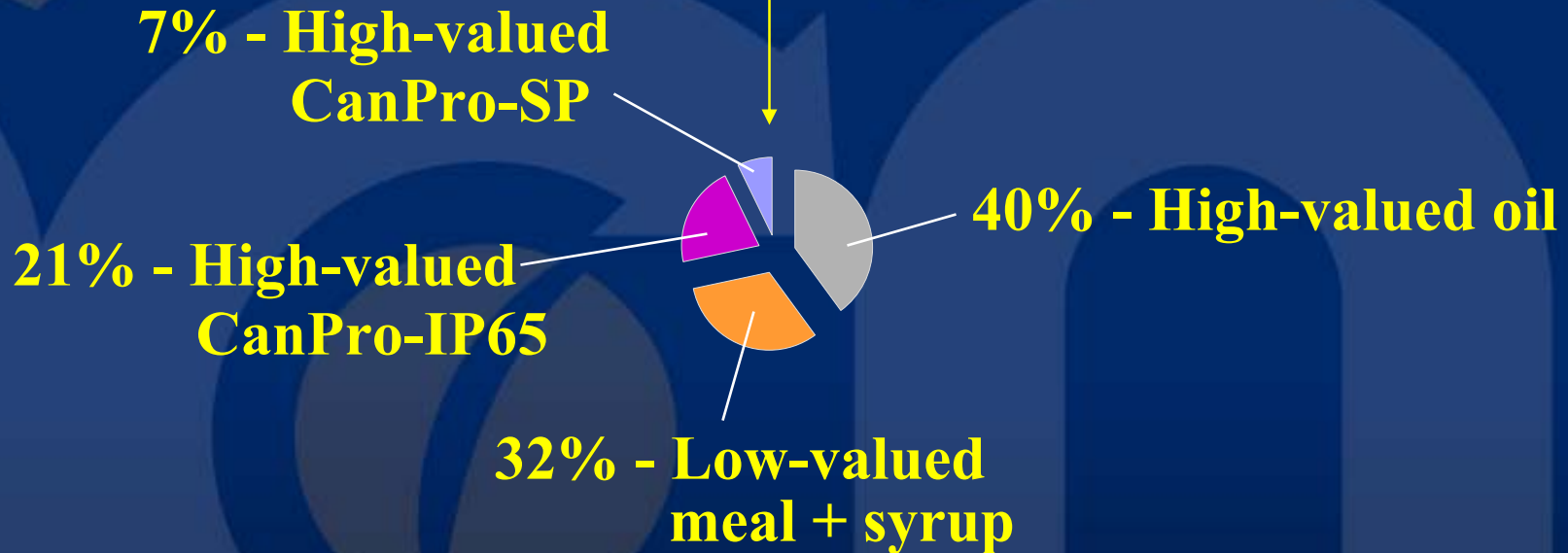


- **Canola protein concentrate could replace up to 50% of the fishmeal content of a typical commercial formulation for Atlantic salmon without adversely affecting feed intake, growth, nutrient utilization, survival or whole body composition**
- **Replacement of up to 50% of the fishmeal in the diet with canola protein concentrate had no affect on any measured parameter of hematology or innate immunity in Atlantic salmon.**

Oil Extraction + MCN Process

 **Whole seed**

- Solvent extraction or “double press”
- MCN Fractionation Process

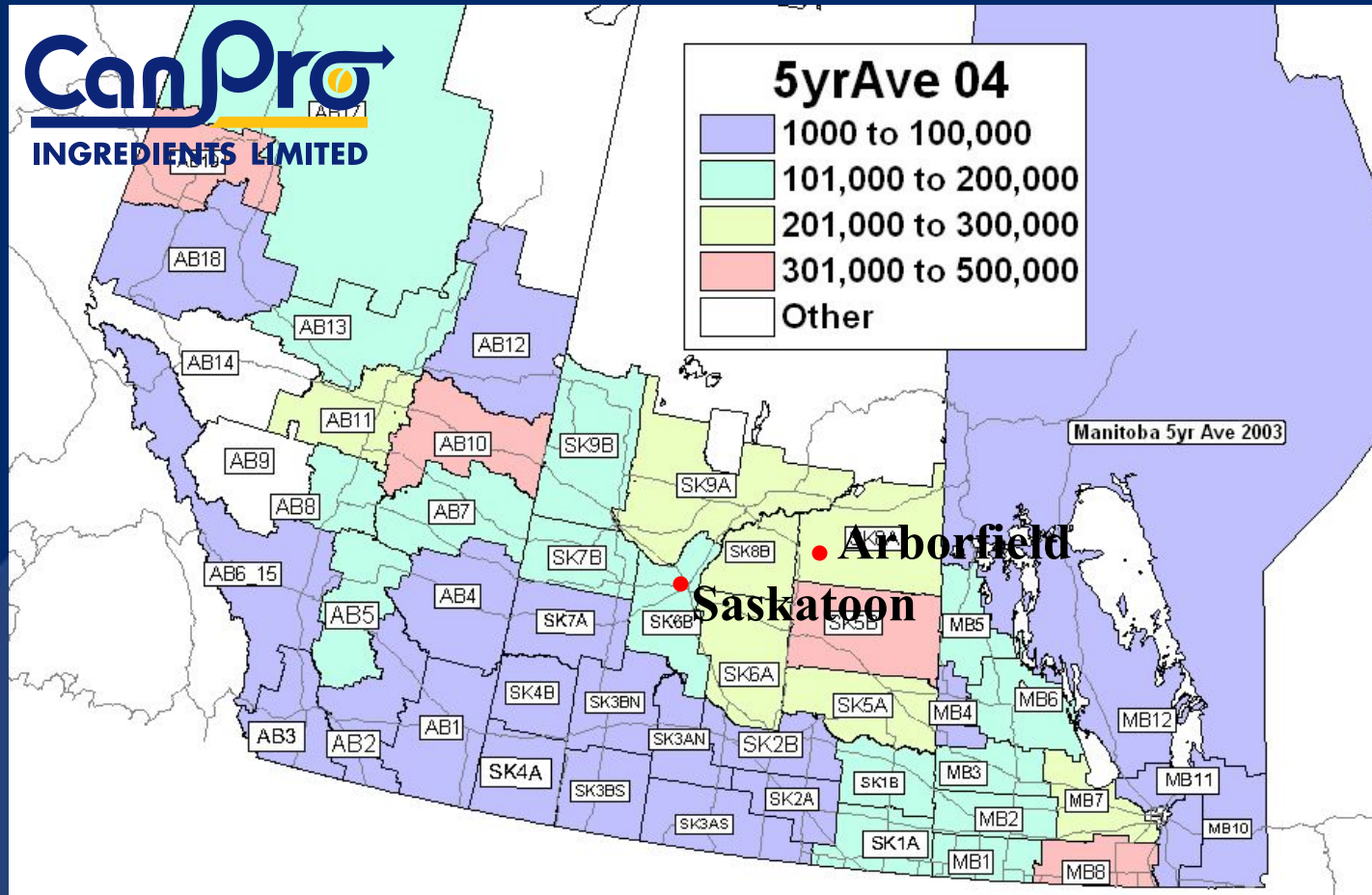


Commercial Implementation of MCN Process



- **CanPro Ingredients Ltd – established April 2007**
 - **Obtained license for canola fraction technology from MCN**
 - **Secured capital for plant construction**
 - **Acquired assets of an existing site in Arborfield Saskatchewan**
 - **Initiated detailed site specific engineering design, construction and equipment procurement**
 - **Anticipated start up – May 2008**

Commercial Implementation of MCN Process

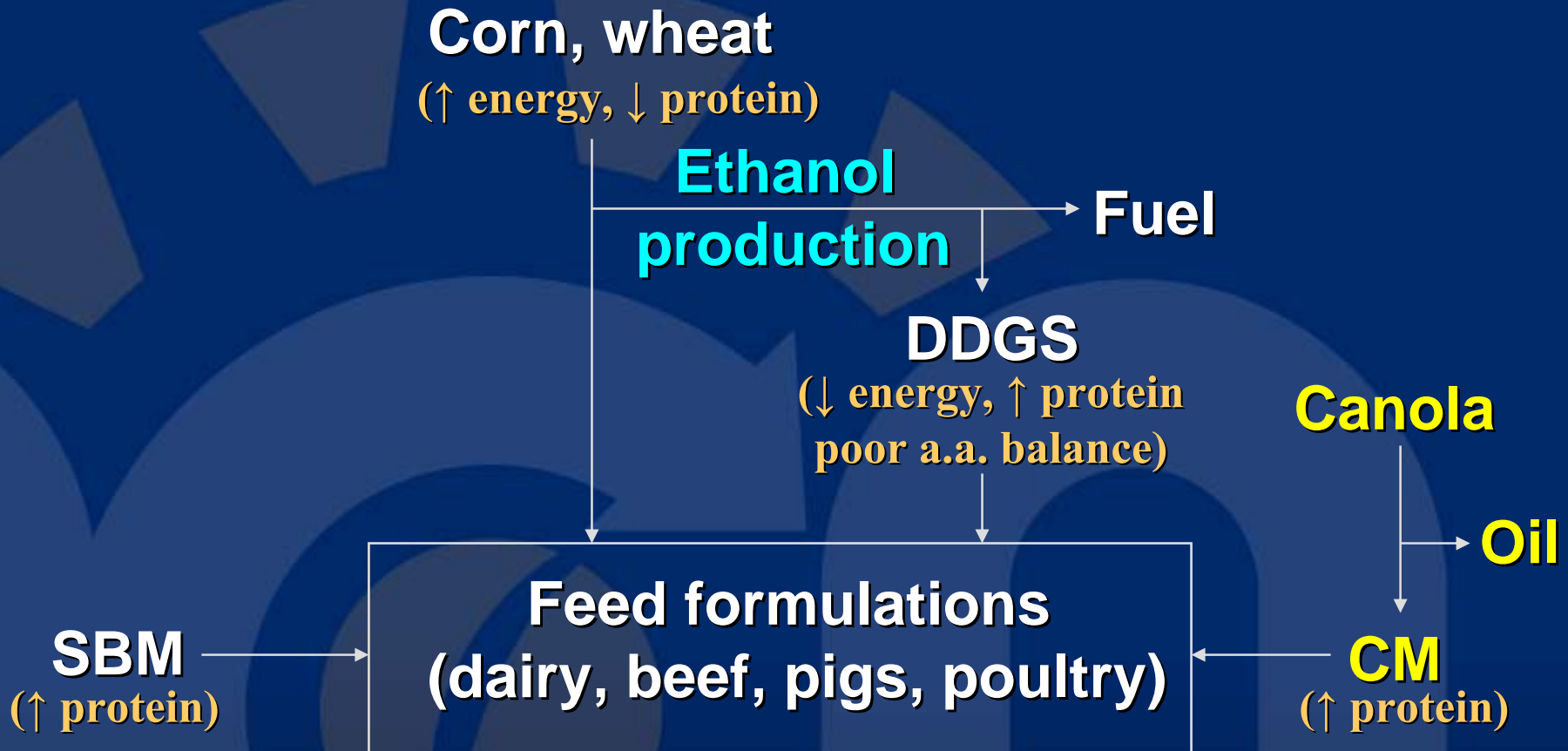


CPI Plant: Non-solvent expeller plant (107 mt/day whole seed)
Annual production - 13,000 mt oil; 6,600 mt IP

Future Value Prospective of De-oiled Canola



Production of canola meal as a low valued commodity

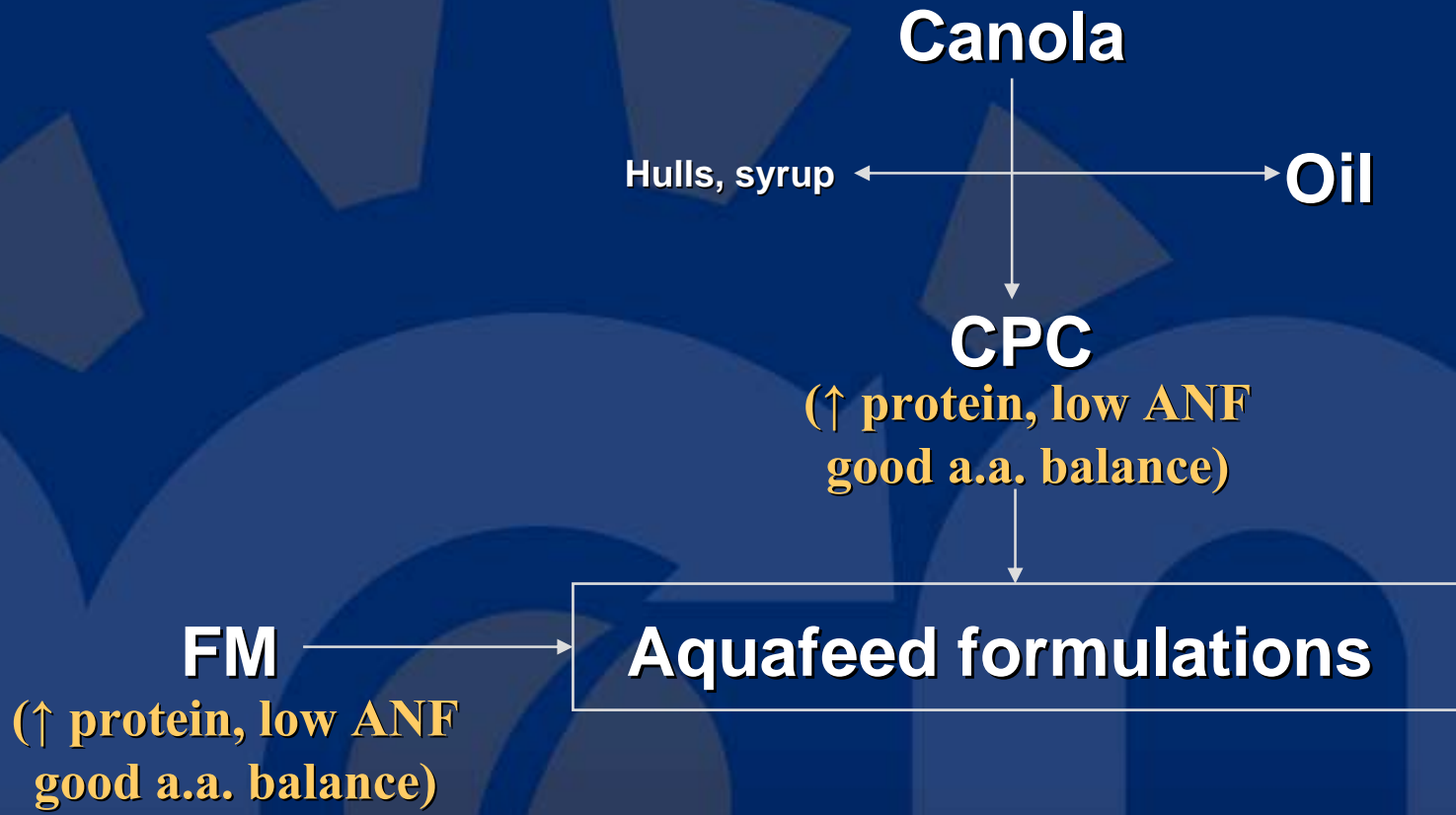


Cheap protein from DDGS = lower value of CM

Future Value Prospective of De-oiled Canola



Production of high valued canola protein concentrates



Low valued commodity protein sources (SBM, CGM DDGS etc) do not define pricing of CPC in aquafeeds)

Market Potential for Canadian Produced CPC

2010 estimate
World Aquafeed
Production
= 32.4 million mt

Annual “plateau”
World Fishmeal
production
= 6.4 million mt





BIOPRODUCTS INC.

