



# Use of high protein distiller's dried grain with yeast in practical diets for the channel catfish, *Ictalurus punctatus*

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# INTRODUCTION



Alternative Proteins for Fish meal/Poultry meal

- Soybean meal
- Distiller's Dried Grains with Solubles (DDGS)
  - Coproduct of ethanol production
  - Grain Sources
    - Most Popular is Corn
    - Wheat, Sorghum, Barley
  - Inexpensive alternative
    - Limiting in lysine



High Protein Distillers grains  
with Yeast HP40Y



Separate **corn fiber**, fermenting,  
use of **specialized sedicanter** to  
remove solubles



# RESEARCH OBJECTIVES



Determine the efficacy of modified high protein distiller's dried grains with yeast as a replacement for poultry meal (PM) and soybean meal (SBM) in practical diets of catfish, *Ictalurus punctatus*.



## Material & Methods: Diet Formulation



Test diets were formulated to be **iso-nitrogenous** and **iso-lipidic** (32% protein and 6.5% lipid)

Ingredient	Basal	PDG3	PDG6	PDG9	SDG5	SDG10	SDG15	SDG20	SDG30	SDG40
Poultry meal	6.00	4.00	2.00	0.00	6.00	6.00	6.00	6.00	6.00	6.00
Soybean meal	55.50	55.50	55.50	55.50	51.00	46.49	41.90	37.40	28.20	19.20
HP40Y	0.00	3.10	6.20	9.30	5.00	10.00	15.00	20.00	30.00	40.00
Menhaden fish oil	3.59	3.55	3.51	3.47	3.15	2.72	2.28	1.84	0.96	0.09
Corn Starch	3.46	2.40	1.34	0.28	3.40	3.34	3.37	3.31	3.39	3.26
Corn	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00
Mineral premix	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Vitamin premix	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Choline chloride	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Rovimix Stay-C	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
CaP-dibasic	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85

Proximate composition<sup>1</sup> (g/100g as is)

Crude protein	33.7	33.58	33.32	34.00	32.75	33.69	32.94	32.48	33.64	33.53
Moisture	6.57	6.22	6.31	6.11	7.86	6.13	7.41	7.69	8.25	6.10
Crude Fat	4.85	5.03	4.96	4.82	4.85	5.03	4.86	4.75	4.50	5.10
Crude Fiber	4.24	4.64	4.66	4.89	4.39	4.71	4.67	4.68	4.93	5.43
Ash	6.63	6.37	6.24	6.22	6.23	6.12	5.83	5.55	5.23	4.93





## Response of juvenile catfish (mean initial weight $1.80 \pm 0.05\text{g}$ ) fed diets containing different levels of HP40Y to replace PM or SBM over a 10-weeks experimental period. Values represented the mean of four replicates

Diets	HP40Y level (%)	Final Biomass (g)	Final weight (g)	Weight Gain (g)	Weight Gain (%)	Total dry Feed (g)	FCR	Survival (%)	NPR (%)
Basal	0.00	478.78a	24.26a	22.41a	1214.66a	24.35a	1.09c	98.75	42.85a
PDG3	3.10	445.03ab	22.25ab	20.50ab	1168.83a	23.27a	1.14bc	100.0	40.43ab
PDG6	6.20	411.08b	21.40b	19.62b	1103.25a	23.52a	1.20ab	96.25	38.47ab
PDG9	9.30	351.28c	18.02c	16.18c	881.92b	20.50b	1.27a	97.50	33.90b
PSE		20.43	1.28	1.29	82.60	0.73	0.04	3.06	3.71
p-value		0.00	0.00	0.00	0.00	0.00	0.00	0.38	0.03
SDG5	5.00	492.83a	24.64a	22.85a	1277.36a	24.24bc	1.06c	100.0	42.11ab
SDG10	10.00	503.58a	25.18a	23.33a	1262.93a	24.83ab	1.07c	100.0	44.82a
SDG15	15.00	511.50a	25.92a	24.13a	1348.62a	25.30ab	1.05c	98.75	43.78a
SDG20	20.00	506.93a	26.00a	24.19a	1340.35a	25.65a	1.06c	100.0	43.65a
SDG30	30.00	402.90b	20.15b	18.35b	1019.81b	23.32c	1.27b	100.0	35.26b
SDG40	40.00	253.00c	12.65c	10.88c	612.99c	18.30d	1.68a	100.0	24.39c
PSE		14.62	0.83	0.85	62.90	0.58	0.03	1.72	3.15
p-value		0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.00

### Outcomes of ANCOVA (P-values)

Model	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.31	<0.0001
Base	0.97	0.78	0.75	0.55	0.31	0.81	0.73	0.67	
Inclusion level	<0.0001	<0.0001	<0.0001	0.00	<0.0001	<0.0001	<0.0001	0.12	<0.0001
Interaction	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.41	<0.0001
(Base*Inclusion)									



# Summary Outcomes...



1. HP40Y proved to be a suitable **protein** source **for replacing alternative ingredients** in catfish diets.
2. HP40Y can be supplemented in the catfish diets up to **20%** **to replace SBM without compromising growth.**
3. HP40Y also contains an **elevated level of yeast**, hence **immune response** should be elevated.



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