Least-Cost Diet Test for Bluegill Sunfish

Charles Hicks, Lincoln University
Chris Hartleb, University of Wisconsin-Stevens Point

Diets

Silvercup™ Standard Trout Diet

- 41% protein
- 12% lipid
  - both fish and poultry oil (50/50 ratio)

*2.5 mm floating » 3.5 mm floating

Least-Cost Formulation Diet

- 41% Protein
  - higher levels of poultry meal
- 7% Lipid
  - fish and lecithin oil (90/10 ratio)
  - ~35% of the total fat from poultry meal

Ingredients

Diet cost ($ tonne^{-1})		Control diet	Alternative diet 1
		885.99	730.37
Ingredients			
Fish meal[1]	975.9	550.0	100.0
Poultry byproduct meal (pet-food grade)	731.9	0.0	278.5
Porcine meal & bone meal[2]	421.6	0.0	0.0
Blood meal[2]	955.1	52.5	158.5
Soybean meal[3]	376.8	85.2	0.0
Corn gluten meal[4]	622.5	0.0	0.0
Corn[5]	171.5	0.0	47.1
Wheat[5]	259.3	251.3	374.9
Fish oil[6]	1477.1	40.0	20
Lecithin[7]	4188.7	3.0	3.0
Dicalcium phosphate[8]	4133.6	2.0	2.0
Vitamin premix[9]	11022.9	10.0	10.0
Vitamin C[10]	1543.2	0.7	0.7
Choline chloride[10]	1543.2	1.4	1.4
Mineral mix[11]	1543.2	1.0	1.0
Binder[12]	2314.8	3.0	3.0

Objective

Using consistent protocols, evaluate performance of age-2 bluegill fed the diet (41% protein / < 8.3% lipid) previously developed by a NCRAC funded project compared to an "industry standard" diet used in the on-going project at two distinct latitude location in ponds for one growing season

Procedures

Lincoln University of Missouri (LU) and the University of Wisconsin-Stevens Point (UW-Stevens Point) will seek to compare age-2 bluegill production at densities of 7,674 sunfish/ha (2,800/acre) using two diets

Earthen ponds at LU and UW-Stevens Point (0.10-ha; 0.25-acre) will be used for part or all of the study described below.

A standardized number of fish from each raceway will then be individually counted into each of six fish hauling compartments until all hauling compartments have enough fingerlings (randomized mix of four stocks) to stock into trial ponds (700 sunfish/pond)

Lincoln Ponds

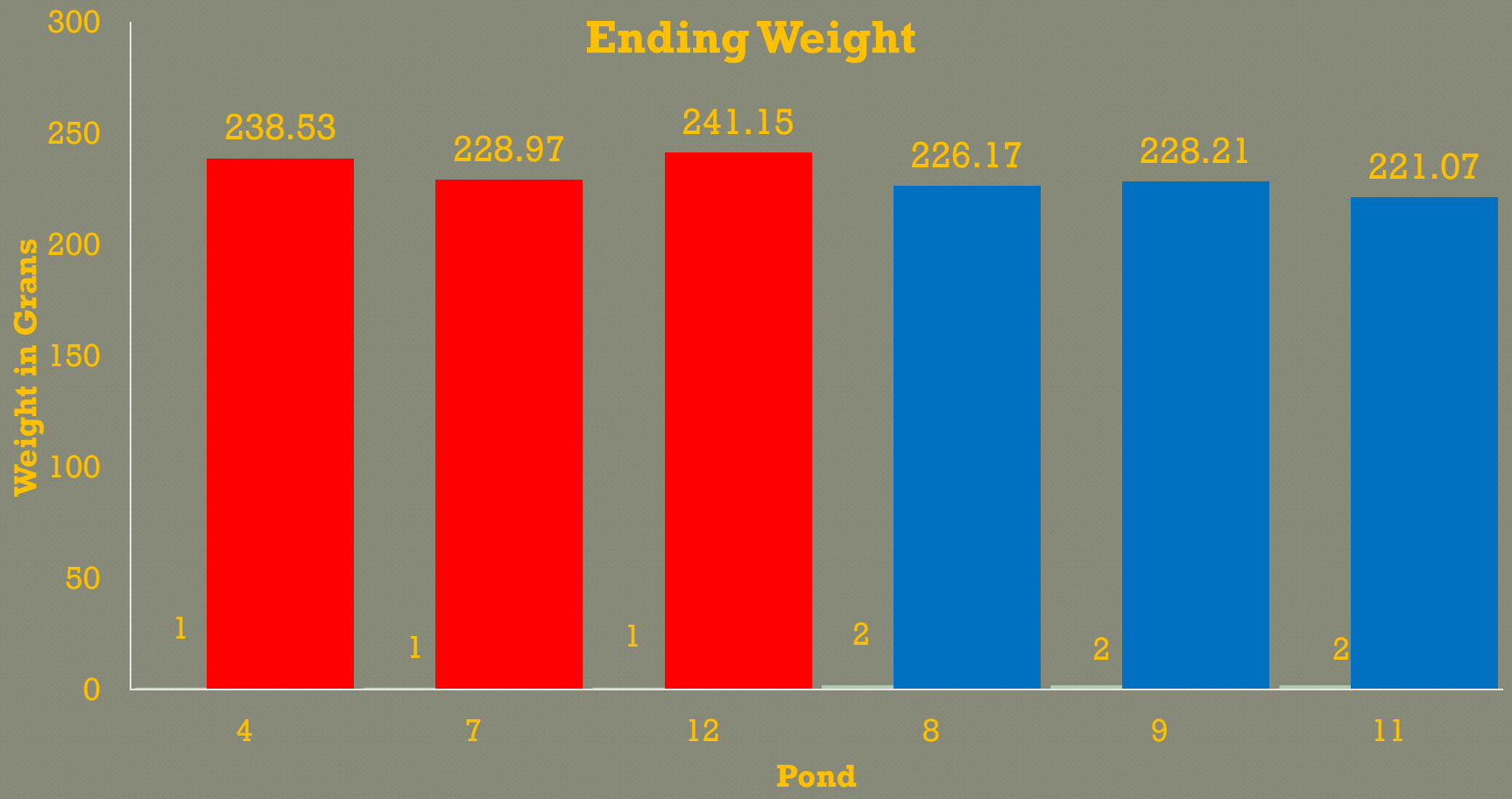
Feeding Trial

- The day following stocking of fish feeding commenced with applications twice daily except once on Saturday and none on Sunday for the duration of a 180-day feeding trial scheduled to ended October 2012
- Fish were fed to apparent satiation (amount they can consume in 15 min) using 3-4 feeding rings (1.52 m (59.30 in) diameter) per pond
- Early morning dissolved oxygen and temperature and afternoon pH and total ammonia nitrogen (NH_3-N) were monitored twice weekly unless low levels approach critical culture limits that require daily measurements.

Harvest

Working up Fish

200 Fish From Each Pond



					Estimate	SE	DF	t	Pr>t
Pond*Diet	4	1	7	1	9.5621	6.1646	624	1.55	0.1214
Pond*Diet	4	1	8	2	12.3615	6.2375	624	1.98	0.0479
Pond*Diet	4	1	9	2	10.3239	6.2529	624	1.65	0.0992
Pond*Diet	4	1	11	2	17.4608	6.2529	624	2.79	0.0054
Pond*Diet	4	1	12	1	-2.6164	6.2375	624	-0.42	0.6750
Pond*Diet	7	1	8	2	2.7994	6.2093	624	0.45	0.6523
Pond*Diet	7	1	9	2	0.7619	6.2247	624	0.12	0.9026
Pond*Diet	7	1	11	2	7.8987	6.2247	624	1.27	0.2049
Pond*Diet	7	1	12	1	-12.1784	6.2093	624	-1.96	0.0503
Pond*Diet	8	2	9	2	-2.0376	6.2969	624	-0.32	0.7464
Pond*Diet	8	2	11	2	5.0993	6.2969	624	0.81	0.4184
Pond*Diet	8	2	12	1	-14.9779	6.2817	624	-2.38	0.0174
Pond*Diet	9	2	11	2	7.1369	6.3121	624	1.13	0.2586
Pond*Diet	9	2	12	1	-12.9403	6.2969	624	-2.06	0.0403
Pond*Diet	11	2	12	1	-20.0772	6.2969	624	-3.19	0.0015

Preparing Samples for Proximate Analysis

20 fillets from each pond were homogenized and sub-samples taken that were frozen using dry ice.

Samples were later delivered to The University of Missouri Tissue Analysis Laboratory for Proximate Analysis

Tissue Analysis

TRT	Weight (0.1 g)	% Dressed	% Fillet	Moisture	%CP	%LIPID	%ASH
SC	238.5	89.5	23.5	76.6	20.9	1.9	1.3
SC	229.0	88.7	22.6	78.0	20.1	1.3	1.3
SC	241.2	88.9	20.6	76.5	21.0	1.7	1.7
TRT	226.2	89.2	24.6	77.4	20.7	1.3	1.3
TRT	228.2	89.7	21.3	77.7	20.3	1.5	1.4
TRT	221.1	89.2	24.3	76.5	20.8	2.1	1.5

Survival and Conversion

Pond	Diet	%Survival	Gain	Conversion
4	1	71.71	28928.1	4.1903201
7	1	77.86	36807.3	3.120631
12	1	74.00	33751	3.9143729
8	2	88.00	54076.1	2.2122342
9	2	47.57	-7684	-14.895029
11	2	61.00	7425.3	15.560718

Contact Information

Project Support Provided by North Central Regional Aquaculture Funding

Principle Investigators: Charles Hicks, Lincoln University of Missouri
Chris Hartleb, University of Wisconsin at Stevens Point

Charles Hicks
Lincoln University
Jefferson City, MO
hicksc@lincolnu.edu