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**EFFECT OF DIETARY PROTEIN  
AND FAT CONTENT ON GROWTH  
OF CARP**

**TRIAL AT SPARSHOLT COLLEGE,  
U.K.**

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# EFFECT OF DIETARY PROTEIN AND FAT CONTENT ON GROWTH OF CARP - TRIAL AT SPARSHOLT COLLEGE, U.K<sup>1</sup>

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## Extended Summary

A 2 x 2 trial was carried out at Sparsholt College to investigate effects of dietary protein (25% and 35%) and fat (5% and 8%) content on growth of common carp (*Cyprinus carpio* L). Using carp weighing 20g initially, 12 tanks (47 litre capacity) were available for this 32 day trial. Water temperatures were 22° to 24°C. The diet composition, including protein and fat content were based on those used in the tilapia trial in Beijing as far as possible (Tables 1a and 1b).

Analysis of the diets (Table 2) indicated higher values than calculated, particularly for the high protein and high fat levels.

Both growth (specific growth rate see Table 3) and feed conversion (feed per unit weight gain, see Table 4) improved with increasing protein; this was highly significant ( $P=0.002$ ). Increasing fat at the low protein level improved both parameters, but did not at the higher level - the interaction protein x fat difference approached significance ( $P=0.095$ ).

These results indicate that in the presence of aquaculture grade fish meal (S. American supplying 27% of dietary protein), where fish oil provided approximately half the added oil, fish growth and feed conversion responded positively to higher dietary protein. They responded to higher dietary fat at the lower protein level, producing growth approaching that of the high protein low fat diet.

These results indicate that carp (20g) require high protein in their diet (35%) and the high fat level (8%). For larger carp (over 100g) a lower protein diet, e.g. 30% coupled with higher fat 8% may be optimum - this is to be tested in subsequent trials in Beijing.

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<sup>1</sup> This work was intended as a preliminary investigation, prior to larger scale trials with carp in China.

**TABLE 1a****DIET FORMULATION g PER 985g OF DRY MIX**

RAW INGREDIENTS	Diet No.			
	1	2	3	4
Fish Meal	100	100	140	140
Rapeseed Meal <sup>1</sup>	65	65	91	91
Soyabean Meal <sup>1</sup>	202	212	410	420
Corn Flour	231	215	410	420
Wholemeal Flour	347	323	183	159
Ca <sub>3</sub> (PO <sub>4</sub> ) <sub>2</sub>	5	5	5	5
Mineral Mix	10	10	10	10
Vitamin Mix	5	5	5	5
Fish Oil	10	25	10	25
Soyabean Oil <sup>1</sup>	10	25	10	25

<sup>1</sup>Details given in Appendix 1**TABLE 1b****MANUFACTURES SPECIFICATION OF STEAM  
DRIED FISH MEAL<sup>2,3</sup>**

Protein	69.15
Histamine ppm	47
Lipid	6.8
Moisture	7.5
Salt	3.5
Sand	0.1
Ash	16.0
Total Volatile Nitrogen mg/kg	113
Digestibility (Torry Mod)	93.8

<sup>2</sup>Fish meal produced in Peru<sup>3</sup>Values in % unless stated otherwise

**TABLE 2  
ANALYSIS OF DIETS**

Diet No.	1	2	3	4
Protein %	26.0	25.5	37.0	37.7
Fat %	5.0	8.6	6.4	9.3

**TABLE 3  
SPECIFIC GROWTH RATE<sup>1</sup> (%)**

Fat Level	5%		8%	
Protein Level	<u>25%</u>	<u>35%</u>	<u>25%</u>	<u>35%</u>
	1.90	2.18	1.99	2.11
				<u>sed</u>
				Fat level 0.044
				Protein level 0.044
				Protein x fat level 0.062
				Interaction

<sup>1</sup> % increase in liveweight per day

sed - standard error of difference

**TABLE 4  
FEED CONVERSION RATIO**

Fat Level	5%		8%	
Protein Level	<u>25%</u>	<u>35%</u>	<u>25%</u>	<u>35%</u>
	2.60	2.25	2.45	2.28
				<u>sed</u>
				Fat level 0.058
				Protein level 0.058
				Protein x fat level 0.082
				Interaction

## APPENDIX

### Fish Oil

Manufactures specification of Polished Crude Fish Oil

Omega 3	25% Min
FFA	3% Max
Antioxidant	200ppm
Moisture and impurities	0.15%
Acidity	2.33%
Iodine index	160-200 Hanus
Mineral Oil	none

### Pure Soya Oil

Specification of Soyola produced in Belgium for Vandemortele (UK)

Energy	3700kj/900kcal
Lipid	99
Saturates	14
Monounsaturates	25
Polyunsaturates	61
Vitamin E	16.5mg/100g

Values in g/100g unless stated otherwise

### Rapeseed Meal

Composition of solvent extracted rapeseed meal(Int.Feed.No. 5-03-871)

Protein	37
Ether extract	1.7
Crude fibre	12
Ash	6.8
Moisture	9
	All values %

### Soyabean Meal

Composition of Soyabean Meal all values in %

Protein	47.5
Lipid	1.3
NFE	27.7
Ash	6.9
Phosphorus	4.1
Moisture	12.6
Supplied by Trouw Aquaculture	

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