

# CONTENTS

	<b>ACKNOWLEDGEMENTS</b>	<b>i - ii</b>
	<b>ABBREVIATIONS USED</b>	<b>iii - iv</b>
	<b>LEGENDS TO THE PLATES</b>	<b>v</b>
<b>1.</b>	<b>INTRODUCTION</b>	<b>1 - 3</b>
<b>2.</b>	<b>LITERATURE SURVEY</b>	<b>4 - 40</b>
<b>2.1.</b>	<b>Nutritional requirements</b>	<b>4 - 22</b>
2.1.1.	Protein	4 - 11
2.1.2.	Lipid	11 - 15
2.1.3.	Carbohydrate	15 - 18
2.1.4.	Energy	18 - 19
2.1.5.	Vitamin	19 - 20
2.1.6.	Minerals	20 - 22
<b>2.2.</b>	<b>Dietary protein source</b>	<b>22 - 30</b>
<b>2.3.</b>	<b>Supplementary feeding in India</b>	<b>30 - 40</b>
<b>3.</b>	<b>MATERIALS AND METHODS</b>	<b>41 - 58</b>
<b>3.1.</b>	<b>Selection of site</b>	<b>41</b>
<b>3.2.</b>	<b>Selection of ponds</b>	<b>41</b>
<b>3.3.</b>	<b>Selection of fish species</b>	<b>41 - 45</b>
<b>3.4.</b>	<b>Experimental trial duration</b>	<b>45 - 46</b>
<b>3.5.</b>	<b>Feed</b>	<b>46 - 53</b>
3.5.1.	Selection feed ingredients	46
3.5.2.	Proximate analysis of the feed ingredients	46 - 47
3.5.2.1.	Moisture	47
3.5.2.2.	Dry matter	47
3.5.2.3.	Crude protein	47 - 48
3.5.2.4.	Crude lipid	49
3.5.2.5.	Crude fibre	49
3.5.2.6.	Nitrogen free extract	50
3.5.2.7.	Ash	50
3.5.2.8.	Calcium	50 - 51
3.5.2.9.	Phosphorus	51

3.5.2.10.	Organic matter	52
3.5.2.11.	Caloric values	52
3.5.3.	Preparation of the diets after compounding	52
3.5.4.	Pelletization and nutrient leaching	52 -53
3.5.5.	Sinking rate of the pelleted diets	53
3.5.6.	storage effects of the pelleted diets	53
<b>3.6.</b>	<b>Experimental aquaria</b>	<b>53 - 54</b>
<b>3.7.</b>	<b>Determination of the feeding rate and time</b>	<b>54</b>
<b>3.8.</b>	<b>Performance of the prepared diets</b>	<b>54 - 57</b>
3.8.1.	Digestibility study	54 - 55
3.8.2.	Fed conversion ratio	55 - 56
3.8.3.	Protein efficiency ratio	56
3.8.4.	Nitrogen balance	56
3.8.5.	Energy balance	56
3.8.6.	Measurement of growth parameters	56 - 57
<b>3.9.</b>	<b>Biochemical composition of the flesh</b>	<b>57</b>
<b>3.10.</b>	<b>Water quality</b>	<b>57</b>
<b>3.11.</b>	<b>Cost effectiveness of the diets</b>	<b>57</b>
<b>3.12.</b>	<b>Statistical analysis</b>	<b>58</b>
	<b>PLATES</b>	<b>59 - 65</b>
<b>4.</b>	<b>RESULTS</b>	<b>66 - 75</b>
<b>4.1.</b>	<b>General and physico-chemical characteristics of soil and water</b>	<b>66 - 67</b>
<b>4.2.</b>	<b>Screening of the locally available feed ingredients</b>	<b>67</b>
<b>4.3.</b>	<b>Bio-chemical composition of the selected ingredients</b>	<b>67</b>
<b>4.4.</b>	<b>Proportion of different ingredients in the prepared diets</b>	<b>67</b>
<b>4.5.</b>	<b>Proximate bio-chemical composition and energy values of the experimental diets</b>	<b>68</b>
<b>4.6.</b>	<b>Quality of the pelleted experimental diets</b>	<b>68</b>

4.7.	<b>Feed intake, faeces release and digestibility of the formulated diets</b>	68 -69
4.8.	<b>Nitrogen and energy balance</b>	69
4.9.	<b>Feed conversion and protein efficiency ratio</b>	69
4.10.	<b>Weight gain, specific growth rate and daily weight gain</b>	70
4.11.	<b>Stocking density of <i>Catla</i>, <i>Labeo</i> and <i>Cirrhinus</i></b>	70
4.12.	<b>Operational inputs during experimental trial</b>	70
4.13.	<b>Fish growth in terms of weight gain</b>	70 - 72
4.13.1.	Growth of <i>Catla</i>	71
4.13.2.	Growth of <i>Labeo</i>	71 - 72
4.13.3.	Growth of <i>Cirrhinus</i>	72
4.14.	<b>Physio - chemical characteristics of water and plankton density</b>	72 - 74
4.14.1.	Ambient water temperature	72 - 73
4.14.2.	pH of water	73
4.14.3.	Dissolved oxygen content	73
4.14.4.	Free carbon dioxide content	73
4.14.5.	Total alkalinity as CaCO <sub>3</sub>	73
4.14.6.	Plankton density	74
4.15.	<b>Proximate composition of the fish flesh</b>	74 - 75
4.16.	<b>Production of fish</b>	75
4.17.	<b>Cost of unit production, gross output and net output</b>	75
	<b>TABLES</b>	77 - 112
	<b>FIGURES</b>	113 - 122
5.	<b>DISCUSSION</b>	123 - 141
5.1.	<b>Physico-chemical characteristics of soil</b>	123 - 124
5.1.1.	pH of soil	124
5.1.2.	Nitrogen content of the soil	124
5.1.3.	Phosphorus content of the soil	124 - 125
5.1.4.	Potassium content of the soil	125
5.1.5.	Organic carbon and C/N ratio	125
5.2	<b>Physico-chemical characteristics of water</b>	126 - 129

5.2.1.	pH of the water	126
5.2.2.	Ambient water temperature	126 - 127
5.2.3.	Dissolved oxygen content of water	127
5.2.4.	Free carbon-do-oxide content of water	127
5.2.5.	Total alkalinity	127 - 128
5.2.6.	Plankton density	128
<b>5.3.</b>	<b>Stocking density and combination ratio of Indian Major carps</b>	<b>128 - 129</b>
<b>5.4.</b>	<b>Feed</b>	<b>129 - 133</b>
5.4.1.	Physical properties and stability of the pelleted diet	129 - 130
5.4.2.	Feed intake by the fish	130
5.4.3.	Nitrogen digestibility	130 - 132
5.4.4.	Nitrogen and energy balance	132 - 133
5.4.5.	Feed conversion ratio and protein efficiency ratio	133
<b>5.5.</b>	<b>Growth rate of the fish</b>	<b>133 - 137</b>
<b>5.6.</b>	<b>Proximate composition of the fish flash</b>	<b>137 - 139</b>
<b>5.7.</b>	<b>Production of the fish</b>	<b>139 - 140</b>
<b>5.8.</b>	<b>Cost of production and net output</b>	<b>140 - 141</b>
<b>6.</b>	<b>CONCLUSION</b>	<b>142</b>
<b>7.</b>	<b>SUMMARY</b>	<b>143 - 146</b>
<b>8.</b>	<b>REFERENCES</b>	<b>147 - 183</b>