

Table of content

1. INTRODUCTION	1
1.1. INVESTIGATION OF EFFECTS OF <i>CHLORELLA VULGARIS</i> IN ANIMAL NUTRITION	5
1.2. INVESTIGATION OF EFFECTS OF <i>CHLORELLA VULGARIS</i> ON ANIMAL HEALTH	5
1.3. INVESTIGATION OF EFFECTS OF <i>CHLORELLA VULGARIS</i> ON ANIMAL REPRODUCTION	6
2. LITERATURE OVERVIEW	7
2.1. TAXONOMY	7
2.2. MORPHOLOGY, PHYSIOLOGY AND OCCURRENCE	7
2.3. NUTRITIONAL VALUE OF GREEN MICRO-ALGAE PROTEIN AS ESTABLISHED IN ANIMAL STUDIES	9
2.3.1. Toxicology and safety of micro-algae in animal studies	24
2.4. PHYSIOLOGICAL EFFECTS OF <i>CHLORELLA VULGARIS</i>	27
2.4.1. Anti-tumor and immune-modulating activity	27
2.4.2. Other aspects of <i>Chlorella vulgaris</i> activities	35
2.4.3. Effect of <i>Chlorella vulgaris</i> and other micro-algae on reproduction system	42
3. MATERIALS AND METHODS	46
3.1. EXPERIMENT 1 – EVALUATION OF EFFICACY OF NOVEL TECHNOLOGICAL PROCESSING OF MICRO-ALGAE USING NITROGEN BALANCE STUDIES IN RATS	46
3.1.1. <i>Chlorella vulgaris</i>	46
3.1.1.1 Cultivation of <i>Chlorella vulgaris</i>	46
3.1.1.2. TECHNICAL PROCESSING – ELECTROPORATION	47
3.1.1.2. Technical processing – electroporation	47
3.1.1.3. Technical processing – ultrasonication	47
3.1.1.4. Composition of <i>Chlorella vulgaris</i>	47
3.1.2. Animals	49
3.1.3. Experimental protocol (grouping, diets, sampling)	51
3.1.4. Analyses	52
3.1.5. Nutritional parameters	53
3.1.6. Statistics	56
3.2. EXPERIMENT 2 – EVALUATING OF EFFECT OF FEEDING SPRAY-DRIED MICRO-ALGAE TO RATS ON BLOOD BIOCHEMICAL PARAMETERS	57
3.2.1. Animals	57
3.2.2. Experimental protocol	57
3.2.3. Blood collection and preparation for analysis	57
3.2.4. Analyses	58
3.2.5. Statistics	58
3.3. EXPERIMENT 3 – NITROGEN BALANCE STUDY AND FEEDING TRIAL UNDERTAKEN TO MEASURE PROLONGED EFFECT OF MICRO-ALGAE ON RATS	59
3.3.1. Animals and protocol	59

3.3.2. <i>Samples</i>	59
3.3.3. <i>Analyses</i>	61
3.3.4. <i>Histological examination</i>	62
3.3.5. <i>Statistics</i>	62
3.4. EXPERIMENT 4 – EFFECT OF FEEDING CHLORELLA VULGARIS ON REPRODUCTIVE AND GROWTH	
PARAMETERS OF MICE	63
3.4.1. <i>Composition of diets</i>	63
3.4.3. <i>Sampling</i>	67
3.4.4. <i>Analyses</i>	67
3.4.5. <i>Statistics</i>	68
3.5. EXPERIMENT 5 – BALANCE STUDY FOR MEASUREMENT OF INFLUENCE OF MICRO-ALGAL	
SUPPLEMENTATION ON NUTRIENTS DIGESTIBILITY AND UTILIZATION IN MICE.	68
3.5.1. <i>Diet</i>	68
3.5.1.1. <i>N-free diet</i>	68
3.5.2. <i>Animals</i>	69
3.5.3. <i>Experimental protocol</i>	69
3.5.4. <i>Analyses</i>	70
3.5.5. <i>Nutritional parameters</i>	70
3.5.6. <i>Statistics</i>	71
4. RESULTS	72
4.1. EXPERIMENT 1 – EVALUATION OF EFFICACY OF NOVEL TECHNOLOGICAL PROCESSING OF MICRO-ALGAE	
IN NITROGEN BALANCE STUDY ON RATS	72
4.2. EXPERIMENT 2 – EVALUATING OF FEEDING SPRAY-DRIED MICRO-ALGAE TO RATS ON BLOOD	
BIOCHEMICAL PARAMETERS	75
4.3. EXPERIMENT 3 – NITROGEN BALANCE STUDY AND FEEDING TRIAL UNDERTAKEN TO MEASURE PROLONGED	
EFFECT OF MICRO-ALGAE ON RATS.	76
4.3.1. <i>Feed and water intake, weight gain, urine production and protein efficiency ratio</i>	76
4.3.2. <i>N-balance and nutritional parameters</i>	79
4.3.3. <i>Internal organs</i>	82
4.3.4. <i>Allantoin and uric acid</i>	85
4.3.5. <i>Biochemical blood parameters</i>	89
4.3.6. <i>Hematology</i>	91
4.3.7. <i>Histology</i>	93
4.4. EXPERIMENT 4 – EFFECT OF FEEDING ON C. VULGARIS ON REPRODUCTION AND GROWTH OF MICE	95
4.4.1. <i>Growth gain of females</i>	95
4.4.2. <i>Litters</i>	96
4.4.3. <i>Fetuses</i>	100
4.4.4. <i>Blood and serum analyzes</i>	101
4.4.5. <i>Internal organs</i>	104

4.5. EXPERIMENT 5 – FEEDING TRIAL FOR MEASUREMENT OF INFLUENCE OF MICRO-ALGAL SUPPLEMENTATION ON FEED’S CRUDE COMPONENTS DIGESTIBILITY.	106
5. DISCUSSION	109
5.1. EVALUATION OF EFFICACY OF NOVEL TECHNOLOGICAL PROCESSING OF MICRO-ALGAE IN NITROGEN BALANCE STUDY ON RATS.....	109
5.2. INFLUENCE OF <i>C. VULGARIS</i> ON ANIMALS PHYSIOLOGICAL PARAMETERS	118
5.2.1. Metabolic and hematological parameters	118
5.2.1.1. Uric acid and allantoin	118
5.2.1.2. Serum enzymes activities and serum total protein.....	120
5.2.1.3. Creatinine and urea.....	122
5.2.1.4. Hematological parameters	122
5.2.1.4.1. Iron status of pregnant mice	124
5.2.1.5. Internal organs.....	125
5.2.2. Effect of <i>Chlorella vulgaris</i> on reproduction	127
5.2.3. Influence of micro-algal supplementation on nutrients’ digestibility and utilization on mice	129
6. SUMMARY	130
7. ZUSAMMENFASSUNG	133
8. REFERENCE LIST	136
9. APPENDIX	151