Conclusion & Recommendations

6. CONCLUSION AND RECOMINDATIONS

From the present study, it was concluded that:

- The technique used in this study succeeded in conserved water consumption, wastewater discharged and reduced the production costs.
- The technique used in this study succeeded in separating of the nutritional material from the wastewater.
- The addition of new dried separated material from the discharge to rats diet did not cause or simple adverse changes in physiological or biochemical parameters tested and showed improvement in growth rates.

Recommendations:

It was recommended that:

- Decreasing the amount of the raw water which is used in rice starch plant as followed in the study would help to preserve the water source, decrease the wastewater as well and decrease the production cost.
- Using the organic extracts which containing a high proportion of protein as new by-product in rice starch plant as additives for animal feed will raise the company's revenue.
- Further studies have to be taken on the techniques used for precipitation to reduce the time and improve the quality of water for reuse more safety and regaining the discharged food stuff to be reused in animal feeding in a way to minimize its desirable defect caused by the precipitating agents.

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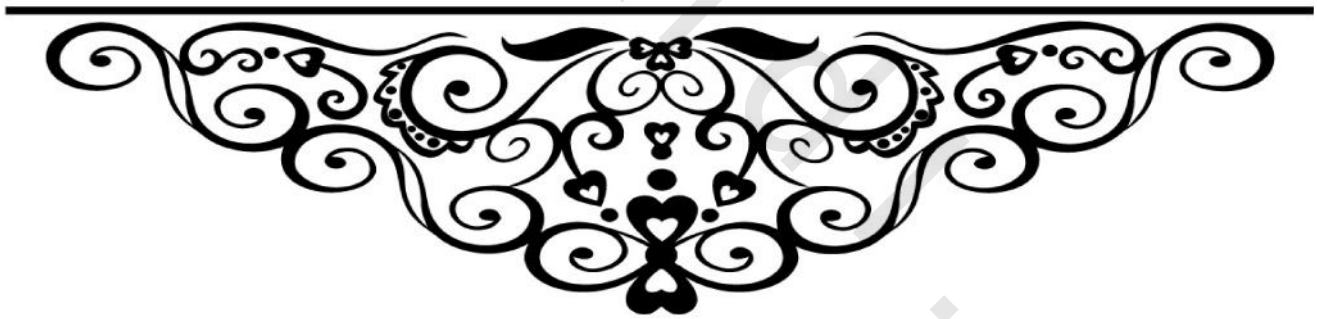

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Appendixes

Appendix 1. a.: Daily Water consumption in rice starch factory (December 2011& January 2012)

Date	Start	End	Vol. of Water (m3)	Date	Start	End	Vol. of Water (m3)
December 2011				January 2012			
1. *	129750	129800	50	1.	144246	144706	460
2. *	129800	129853	53	2.	144706	145246	540
3. *	129853	129902	49	3.	145246	145796	550
4. *	129902	129951	49	4.	145796	146352	556
5. *	129951	130001	50	5.	146352	146967	615
6. *	130001	130055	54	6.	146967	147507	540
7. *	130055	130102	47	7.	147507	148073	566
8.	130102	130188	86	8.	148073	148588	515
9.	130188	130547	359	9.	148588	149213	625
10.	130547	131209	662	10.	149213	149818	605
11.	131209	131881	672	11.	149818	150388	570
12.	131881	132431	550	12.	150388	150888	500
13.	132431	133141	710	13.	150888	151493	605
14.	133141	133741	600	14.	151493	152040	547
15.	133741	134453	712	15.	152040	152668	628
16.	134453	135153	700	16.	152668	153226	558
17.	135153	135793	640	17.	153226	153789	563
18.	135793	136508	715	18.	153789	154329	540
19.	136508	137151	643	19.	154329	154929	600
20.	137151	137763	612	20.	154929	155504	575
21.	137763	138444	681	21.	155504	155983	479
22.	138444	139039	595	22.	155983	156283	300
23.	139039	139664	625	23. *	156283	156338	55
24.	139664	140214	550	24. *	156338	156388	50
25.	140214	140764	550	25. *	156388	156437	49
26.	140764	141317	553	26. *	156437	156485	48
27.	141317	142008	691	27. *	156485	156533	48
28.	142008	142715	707	28. *	156533	156583	50
29.	142715	143346	631	29. *	156583	156632	49
30.	143346	143846	500	30. *	156632	156682	50
31.	143846	144246	300	31. *	156682	156732	50
Average	(13658 -1100) / 22 = 570			Average	(11277 – 1000) / 20 = 513		

- Average water consumption =(total exactly daily water consumption exp first and end work day consumption) – (50 x number of working day exp first and end work day) / number of working day exp first and end work day
- *Daily consumption during the production process is stopped

Appendix1. b.: Daily Water consumption in rice starch factory (February 2012& April 2012)

Date	Start	End	Vol. of Water (m3)	Date	Start	End	Vol. of Water (m3)
February 2012				April 2012			
1. *	156732	156783	51	1.	171502	171582	80
2. *	156783	156833	50	2.	171582	172262	680
3. *	156833	156883	50	3.	172262	172946	684
4. *	156883	156931	48	4.	172946	173601	655
5. *	156931	156984	53	5.	173601	174273	672
6.	156984	157069	85	6.	174273	174965	692
7.	157069	157557	488	7.	174965	175617	652
8.	157557	158219	662	8.	175617	176209	592
9.	158219	158785	566	9.	176209	176808	599
10.	158785	159408	623	10.	176808	177476	668
11.	159408	160085	677	11.	177476	178101	625
12.	160085	160647	562	12.	178101	178699	598
13.	160647	161229	582	13.	178699	179314	615
14.	161229	161798	569	14.	179314	179989	675
15.	161798	162410	612	15.	179989	180550	561
16.	162410	162988	578	16.	180550	181125	575
17.	162988	163632	644	17.	181125	181699	574
18.	163632	164187	555	18.	181699	182357	658
19.	164187	164767	580	19.	182357	183057	700
20.	164767	165369	602	20.	183057	183662	605
21.	165369	165994	625	21.	183662	184237	575
22.	165994	166635	641	22.	184237	184739	502
23.	166635	167247	612	23.	184739	185039	300
24.	167247	167833	586	24.	185039	185095	56
25.	167833	168491	658	25.	185095	185107	12
26.	168491	169106	615	26.	185107	185147	40
27.	165480	169566	460	27.	185147	185197	50
28.	169566	169942	376	28.	185197	185249	52
Average	(12497 – 1050) / 21 = 545			29.	185249	185299	50
				30.	185299	185348	49
				Average	(13157 – 1050) / 21 = 576		

Appendix1. c.: Daily Water consumption in rice starch factory (July 2012& September 2012)

Date	Start	End	Vol. of Water (m3)	Date	Start	End	Vol. of Water (m3)
July 2012				September 2012			
1.	188448	188538	90	1.	204073	204123	50
2.	188538	189163	625	2.	204123	204173	50
3.	189163	189861	698	3.	204173	204221	48
4.	189861	190506	645	4.	204221	204271	50
5.	190506	191161	655	5.	204271	204322	51
6.	191161	191845	684	6.	204322	204369	47
7.	191845	192530	685	7.	204369	204419	50
8.	192530	193208	678	8.	204419	204504	85
9.	193208	193811	603	9.	204504	205054	550
10.	193811	194413	602	10.	205054	205672	618
11.	194413	195014	601	11.	205672	206264	592
12.	195014	195672	658	12.	206264	206839	575
13.	195672	196272	600	13.	206839	207394	555
14.	196272	196914	642	14.	207394	207983	589
15.	196914	197519	605	15.	207983	208588	605
16.	197519	198169	650	16.	208588	209187	599
17.	198169	198872	703	17.	209187	209749	562
18.	198872	199498	626	18.	209749	210301	552
19.	199498	200119	621	19.	210301	210876	575
20.	200119	200748	629	20.	210876	211463	587
21.	200748	201347	599	21.	211463	212060	597
22.	201347	201847	500	22.	212060	212638	578
23.	201847	202075	228	23.	212638	213235	597
24. *	202075	202129	54	24.	213235	213806	571
25. *	202129	202179	50	25.	213806	214390	584
26. *	202179	202226	47	26.	214390	215045	655
27. *	202226	202276	50	27.	215045	215653	608
28. *	202276	202326	50	28.	215653	216246	593
29. *	202326	202375	49	29.	216246	216764	518
30. *	202375	202425	50	30.	216764	217098	334
31. *	202425	202473	48				
Average	(13309 - 1050) / 21 = 583			Average	(12260 – 1050) / 21 = 534		

Appendix1. d.: Daily Water consumption in rice starch factory (October 2012& December 2012)

Date	Start	End	Vol. of Water (m3)	Date	Start	End	Vol. of Water (m3)
October 2012				December 2012			
1.	217098	217398	300	1. *	232125	232175	50
2.	217398	217952	554	2. *	232175	232225	50
3.	217952	218557	605	3. *	232225	232272	47
4.	218557	219209	652	4. *	232272	232320	48
5.	219209	219809	600	5. *	232320	232366	46
6.	219809	220284	475	6. *	232366	232416	50
7.	220284	220934	650	7. *	232416	232471	55
8.	220934	221559	625	8.	232471	232553	82
9.	221559	222208	649	9.	232553	233068	515
10.	222208	222799	591	10.	233068	233670	602
11.	222799	223399	600	11.	233670	234274	604
12.	223399	224049	650	12.	234274	234894	620
13.	224049	224674	625	13.	234894	235504	610
14.	224674	225274	600	14.	235504	236092	588
15.	225274	225839	565	15.	236092	236676	584
16.	225839	226415	576	16.	236676	237262	586
17.	226415	226985	570	17.	237262	237844	582
18.	226985	227554	569	18.	237844	238436	592
19.	227554	228169	615	19.	238436	239036	600
20.	228169	228774	605	20.	239036	239605	569
21.	228774	229374	600	21.	239605	240202	597
22.	229374	229962	588	22.	240202	240795	593
23.	229962	230217	255	23.	240795	241380	585
24. *	230217	230272	55	24.	241380	241964	584
25. *	230272	230324	52	25.	241964	242549	585
26. *	230324	230375	51	26.	242549	243104	555
27. *	230375	230425	50	27.	243104	243666	562
28. *	230425	230475	50	28.	243666	244817	572
29. *	230475	230524	49	29.	244817	245396	579
30. *	230524	230574	50	30.	245396	245905	509
31. *	230574	230622	48	31.	245905	246180	275
Average	(12564 – 1050) / 21=548			Average	(12773 – 1050) /21=558		

Appendix1. e.: Daily Water consumption in rice starch factory (May 2013& June 2013)

Date	Start	End	Vol. of Water (m3)	Date	Start	End	Vol. of Water (m3)
May 2013				June 2013			
1.	252248	252295	47	1.	265855	266031	176
2.	252295	252344	49	2.	266031	266543	512
3.	252344	252395	51	3.	266543	267168	625
4.	252395	252445	50	4.	267168	267844	676
5.	252445	252496	51	5.	267844	268453	609
6.	252496	252546	50	6.	268453	269052	599
7.	252546	252598	52	7.	269052	269652	600
8.	252598	252687	89	8.	269652	270241	589
9.	252687	253236	549	9.	270241	270825	584
10.	253236	253851	615	10.	270825	271414	589
11.	253851	254475	624	11.	271414	272005	591
12.	254475	255059	584	12.	272005	272617	612
13.	255059	255675	616	13.	272617	273222	605
14.	255675	256290	615	14.	273222	273810	588
15.	256290	256885	595	15.	273810	274400	590
16.	256885	257435	550	16.	274400	274977	577
17.	257435	258005	570	17.	274977	275610	633
18.	258005	258595	590	18.	275610	276183	573
19.	258595	259184	589	19.	276183	276807	624
20.	259184	259759	575	20.	276807	277400	593
21.	259759	260350	591	21.	277400	278012	612
22.	260350	260969	619	22.	278012	278589	577
23.	260969	261536	567	23.	278589	279111	522
24.	261536	262124	588	24.	279111	279435	324
25.	262124	262725	601	25. *	279435	279493	58
26.	262725	263323	598	26. *	279493	279545	52
27.	263323	263869	546	27. *	279545	279595	50
28.	263869	264460	591	28. *	279595	279642	47
29.	264460	265043	583	29. *	279642	279690	48
30.	265043	265542	499	30. *	279690	279740	50
31.	265542	265855	313				
Average	(12855 – 1100) /22=534			Average	(13080 – 1100) / 22=544		

Appendix1. f.: Daily Water consumption in rice starch factory (November 2013& March 2014)

Date	Start	End	Vol. of Water (m3)	Date	Start	End	ol. of Water (m3)
November 2013				**March 2013**			
1.	285900	285947	47	1.	308173	308339	166
2.	285947	285998	51	2	308339	308879	540
3.	285998	286049	51	3	308879	309504	625
4.	286049	286099	50	4	309504	310110	606
5.	286099	286150	51	5	310110	310710	600
6.	286150	286199	49	6	310110	311298	588
7.	286199	286251	52	7	311298	311998	700
8.	286251	286330	79	8	311998	312586	588
9.	286330	286889	559	9	312586	313180	594
10.	286889	287494	605	10	313180	313780	600
11.	287494	288098	604	11	313780	314359	579
12.	288098	288698	600	12	314359	314962	603
13.	288698	289285	587	13	314962	315554	592
14.	289285	289873	588	14	315554	316225	671
15.	289873	290468	595	15	316225	316769	544
16.	290468	291018	550	16	316769	317338	569
17.	291018	291608	590	17	317338	317922	584
18.	291608	292188	580	18	317922	318573	651
19.	292188	292787	599	19	318573	319273	700
20.	292787	293362	575	20	319273	319954	681
21.	293362	293976	614	21	319954	320540	586
22.	293976	294591	615	22	320540	321117	577
23.	294591	295172	581	23	321117	321649	532
24.	295172	295758	586	24	321649	321948	299
25.	295758	296359	601	25	321948	322003	55
26.	296359	296938	579	26	322003	322056	53
27.	296938	297525	587	27	322056	322105	49
28.	297525	298135	610	28	322105	322153	48
29.	298135	298750	615	29	322153	322203	50
30.	298750	299073	323	30	322203	322253	50
				31	322253	322303	50
Average	(12822 – -1050) /21=541			Average	(13310 – 1100) / 22=555		

Appendix2. a.: Flow rate of wet cleaning wastewater from discharge point

Date	No.	Vol. of Water (litre)	Duration Time(sec.)	Flow rate (L/sec.)
10/12/2011	1	15.000	6.5	2.31
	2	15.500	6.8	2.28
	3	14.400	6.4	2.25
18/2/2012	1	16.100	7.0	2.30
	2	15.000	6.5	2.31
	3	16.000	7.0	2.29
18/9/2012	1	15.800	6.9	2.29
	2	16.000	6.9	2.32
	3	15.500	6.8	2.28
15/6/2013	1	15.800	6.9	2.29
	2	15.700	6.8	2.31
	3	16.800	7.4	2.27

Average Flow rate = 2.291 L/sec
The average working time = 80 min/day
Wastewater discharged per day= 11 m^3/day

Appendix2. b.: The flow rate of soaking wastewater discharging from discharge point

Date	No.	Vol. of Water (litre)	Duration Time(sec.)	Flow rate (L/sec.)
10/12/2011	1	17.700	6.5	2.72
	2	18.200	6.8	2.69
	3	16.000	5.9	2.71
18/2/2012	1	17.800	6.6	2.70
	2	15.000	5.5	2.71
	3	18.000	6.6	2.70
18/9/2012	1	15.000	5.5	2.73
	2	17.800	6.6	2.68
	3	16.100	6.0	2.70
15/6/2013	1	17.400	6.4	2.74
	2	16.100	5.9	2.71
	3	15.000	5.5	2.71

Average Flow rate for basin =2.708 L/sec , The average working time of basin 20min/day
Number of soaking basin per day 4 , Soaking wastewater discharged per day= 13 m^3/day

Appendix2. c.: Flow rate of clean water discharging from the first centrifuge process using plastic bag and stopwatch

Date	No.	Vol. of Water (litre)	Duration Time(sec.)	Flow rate (L/sec.)
25/12/2011	1	18.200	3.5	5.20
	2	22.400	4.3	5.21
	3	26.000	5.0	5.20
15/7/2012	1	23.500	4.5	5.22
	2	20.250	3.9	5.19
	3	17.600	3.4	5.18
20/12/2012	1	23.800	4.6	5.17
	2	21.400	4.1	5.22
	3	16.000	3.1	5.16
9/6/2013	1	22.800	4.4	5.18
	2	23.800	4.5	5.29
	3	22.300	4.3	5.19

Average Flow rate = 5.2 L/sec, The average working time on 16 hour/day, Clean water discharged per day= 300 m^3/day

Appendix2. d.: Flow rate of wastewater discharging from the first centrifuge process using plastic bag and stopwatch

Date	No.	Vol. of Water (litre)	Duration Time(sec.)	Flow rate (L/sec.)
22/12/2011	1	15.900	3.0	5.3
	2	21.000	4.0	5.25
	3	24.100	4.6	5.24
15/2/2012	1	23.400	4.5	5.20
	2	21.400	4.1	5.22
	3	23.800	4.5	5.29
18/9/2012	1	22.800	4.4	5.18
	2	22.300	4.3	5.19
	3	21.400	4.1	5.22
15/5/2013	1	24.200	4.6	5.26
	2	18.200	3.5	5.20
	3	21.000	4.0	5.25

Average Flow rate = 5.233 l/sec, The average working time 8 hour/day , waste water discharged per day= 150 m^3/day

Appendix3. a.: Chemical composition of broken rice (grade zero)

Date	Crude Protein	Fat	Ash	Crude Fiber	Total Carbohydrate
24/11/2011	8.65	0.699	1.92	1.52	87.211
25/2/2012	8.80	0.769	1.71	1.43	87.291
10/7/2012	8.62	0.749	1.84	1.51	87.281
20/12/2012	8.79	0.743	1.85	1.44	87.177
12/5/2013	8.75	0.745	1.81	1.51	87.185
Average	8.72	0.74	1.83	1.48	87.23

* As dry weight * Available carbohydrate by difference

Moisture content of grade zero was 11.89%, 11.95 %, 11.90%, 11.84% and 11.89 respectively

Appendix3. b.: Chemical composition of broken rice (grade one)

Date	Crude Protein	Fat	Ash	Crude Fiber	Total Carbohydrate
24/11/2011	8.82	0.696	1.95	1.57	86.964
25/2/2012	8.78	0.869	1.87	1.46	87.021
10/7/2012	8.94	0.763	1.91	1.39	86.997
20/12/2012	8.72	0.872	1.83	1.46	87.118
12/5/2013	8.75	0.725	2.05	1.62	86.855
Average	8.80	0.79	1.92	1.50	86.99

* As dry weight * Available carbohydrate by difference

Moisture content of grade zero was 11.85%, 11.78%, 11.67%, 11.75% and 11.90 respectively

Appendix4. a.: Characteristics of Wet cleaning wastewater

Date	pH	T.S	T.SS	T.DS	COD	BOD	Temp °C
22/12/2011	6.23	32105	21299	10806	19095	12600	24
06/07/2012	6.00	32484	21726	10758	19325	12779	27
11/10/2012	6.84	29114	20290	8824	17489	11737	26
11/12/2012	6.68	29878	20699	9179	18000	12000	24
15/05/2013	6.58	28807	19869	8938	17304	11594	26
15/3/2014	6.56	27860	19232	8628	16789	11290	25
Average	6.48	30041	20519.3	9522.16	18000	12000	25.33

Appendix4. b.: Chemical analysis of Wet cleaning wastewater

Date	T.S	Crude protein	Fat	Crude Fiber	Ash	Total Carbohydrate	Sodium chloride
22/12/2011	3.21	0.668	0.149	0.221	0.190	1.982	0.069
06/07/2012	2.91	0.654	0.151	0.198	0.187	1.720	0.065
11/10/2012	2.90	0.612	0.139	0.189	0.205	1.755	0.076
11/12/2012	2.98	0.619	0.152	0.215	0.205	1.789	0.051
15/05/2013	3.11	0.648	0.158	0.213	0.201	1.890	0.065
15/3/2014	2.89	0.641	0.134	0.200	0.208	1.707	0.064
Average	3.00	0.640	0.147	0.206	0.199	1.808	0.065

Appendix4. c.: Characteristics of soaking wastewater

Date	**PH**	**T.S**	**T.S.S**	**T.D.S**	**COD**	**BOD**	**Temp °C**
18/1/2012	4.14	44178	28845	15333	23999	16125	23
6/4/2012	4.60	44430	29067	15363	24100	16283	24
18/9/2012	4.30	40800	26212	14588	21995	14562	25
16/10/2012	4.62	45800	29354	16446	24924	16495	24.5
15/12/2012	4.48	46548	29779	16769	25678	17059	23
10/6/2013	4.70	46559	29795	16764	25704	17072	24
Average	4.47	44719	28842	15877	24400	16.266	23.9

Appendix4. d.: Chemical composition of soaking wastewater

Date	T.S	Crude protein	Fat	Crude Fiber	Ash	Total Carbohydrate	Sodium chloride
18/1/2012	4.418	1.612	0.089	0.319	0.291	2.107	0.085
6/4/2012	4.443	1.504	0.088	0.302	0.301	2.248	0.095
18/9/2012	4.080	1.425	0.099	0.297	0.301	1.958	0.099
16/10/2012	4.580	1.529	0.098	0.298	0.275	2.38	0.115
15/12/2012	4.655	1.651	0.090	0.286	0.289	2.339	0.103
10/6/2013	4.656	1.669	0.088	0.298	0.271	2.330	0.097
Average	4.472	1.565	0.092	0.300	0.288	2.227	0.099

Appendix4. e.: Characteristics of first centrifuge wastewater

Date	PH	T.S	T.S.S	T.D.S	COD	BOD	Temp °C
9/2/2012	9.68	7540	3170	4370	5290	3550	28
5/4/2012	9.68	8199	3375	4824	5899	3925	30
12/7/2012	9.63	8055	3362	4693	5790	3845	32
24/9/2012	9.88	8645	3195	5450	6066	4140	31
21/12/2012	9.40	8002	3383	4619	5740	3790	31
25/5/2012	9.39	8819	3225	5594	6315	4150	31
Average	9.61	8210	3285	4925	5850	3900	30.5

Appendix4. f.: Chemical composition of first centrifuge wastewater

Date	T.S	Crude protein	Fat	Crude Fiber	Ash	Total Carbohydrate	Sodium chloride
9/2/2012	0.754	0.262	0. 010	0.049	0.034	0.399	0.012
5/4/2012	0.819	0.346	0.012	0.043	0.039	0.379	0.014
12/7/2012	0.805	0.324	0. 009	0.052	0.040	0.380	0.015
24/9/2012	0.864	0.391	0.010	0.059	0.046	0.358	0.014
21/12/2012	0.800	0.340	0.010	0.049	0.038	0.363	0.015
25/5/2012	0.881	0.419	0.009	0.042	0.049	0.362	0.014.
Average	0.821	0.347	0.010	0.049	0.041	0.374	0.014

Appendix4. g.: Characteristics of dilute screen milling waste water

Date	PH	T.S	T.S.S	T.D.S	COD	BOD	Temp °C
23/1/2012	7,5	58113	56056	2057	29206	19158	25
1/3/2012	7,73	54539	52610	1929	27410	17980	25.5
24/10/2012	8,15	57648	55654	2030	28991	19017	24.5
1/1/2013	7,38	54547	52602	1945	27414	17983	25.5
25/6/2013	8.00	56218	54229	1989	28254	18534	23.5
1/12/2013	8.04	56207	54223	1984	28249	18530	26
Average	7.8	56218	54229	1989	28254	18534	25

Appendix4. f.: Chemical composition of dilute screen milling wastewater

Date	T.S	Crude protein	Fat	Crude Fiber	Ash	Total Carbohydrate	Sodium chloride
23/1/2012	5..811	0.654	0. 039	0.599	0.402	4.117	0.105
1/3/2012	5.454	0.645	0.042	0.590	0.402	3.775	0.114
24/10/2012	5.765	0.641	0.042	0.596	0.411	4.075	0.115
1/1/2013	5.455	0.646	0.042	0.585	0.390	3.792	0.099
25/6/2013	5.622	0.651	0.033	0.591	0.396	3.951	0.113
1/12/2013	5.621	0.639	0.036	0.579	0.393	3.974	0.120
Average	5.622	0.646	0.039	0.590	0.399	3.947	0.111

Appendix4. h. Characteristics of concentrate screen milling waste water

Date	**PH**	**T.S**	**T.S.S**	**T.D.S**	**COD**	**BOD**	**Temp °C**
23/1/2012	7,5	244122	236937	7485	64668	32774	25
1/3/2012	7,73	229111	222368	6743	60692	30759	25.5
24/10/2012	8,15	242324	235239	7463	64192	32533	24.5
1/1/2013	7,38	229145	222337	6808	60701	30764	25.5
25/6/2013	8.00	236164	229214	6672	62560	31706	23.5
1/12/2013	8.04	236118	229189	6529	62548	31700	26
Average	7.8	236164	229214	6950	62560	31706	25

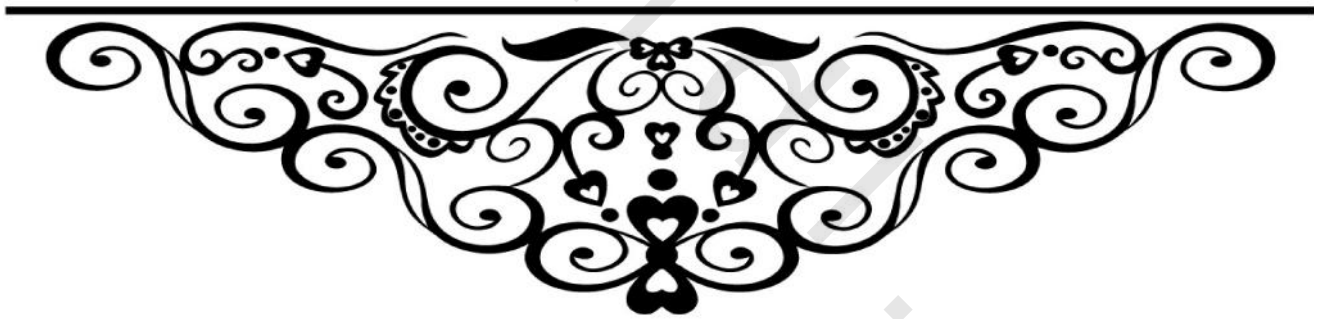
Appendix4. i.: Chemical composition of concentrate screen milling wastewater

Date	T.S	Crude protein	Fat	Crude Fiber	Ash	Total Carbohydrate	Sodium chloride
23/1/2012	24.412	2.749	0. 157	3.477	1.99	16.039	0.105
1/3/2012	22,911	2.717	0.176	3.458	1.79	14.770	0.114
24/10/2012	24.232	2.700	0.171	3.503	2.03	15.828	0.115
1/1/2013	22.915	2.721	0.173	3.452	1.85	14.719	0.099
25/6/2013	23.616	2.742	0.136	3.499	1.87	15.369	0.113
1/12/2013	23.612	2.691	0.147	3.491	1.95	15.333	0.120
	236164	2.72	0.160	3.480	1.91	15.343	0.111

Appendix5. Egyptian Environmental Legal Requirements for Industrial Wastewater

Parameter (mg/L) unless otherwise noted Law4/94	Discharge Coastal Environment Law 93/62	Discharge to Sewer System (as modified by Decree 44/2000)	Law 48/82: Discharge into :			
			Underground Reservoir &Nile Branches/Canals Nile	Main Stream	Drains	
					Municipal	Industrial
BOD (5day, 20 deg.)	**60**	**<600**	**20**	**30**	**60**	**60**
COD	**100**	**<1100**	**30**	**40**	**80**	**100**
PH	**6-9**	**6-9.5**	**6-9**	**6-9**	**6-9**	**6-9**
Oil & Grease	**15**	**<100**	**5**	**5**	**10**	**10**
Temperature (deg.	**10C>avg. temp of receiving body**	**<43**	**35**	**35**	**35**	**35**
Total Suspended Solids	**60**	**<800**	**30**	**30**	**50**	**60**
Settable Solids	**—**	**8cm^3/ l (10min) 15 cm^3/ l (30 min)**	**—**	**20**	**—**	**—**
PO_4	**5**	**-----**	**__**	**1**	**---**	**10**
Total phosphorus	**------**	**25**	**------**	**----**	**-----**	**-----**
Fluoride	**1**	**----**	**0.5**	**0.5**	**----**	**0.5**
Total Dissolved Solids	**2000**	**----**	**800**	**1200**	**2000**	**2000**

Arabic Summary



بصورة طبيعية في جميع مجموعات المعاملة بينما لوحظ ظهور بعض التجمعات البروتينية و سماكة في الأنابيب في مجموعة المعاملة ١٠ %.

وقد أوصت الدراسة بما يأتى:

- أهميه تقليل كمية المياه الخام المستخدمة في صناعة نشا الأرز وانخفاض مياه الصرف الصناعى للمحافظة على مصادر المياه و خفض تكاليف الإنتاج.
- استخدام المستخلصات العضوية من مياه صرف مصنع نشا الأرز والتي تحتوي على نسبة عالية من البروتين كإضافات لتغذية الحيوانات لرفع إيرادات الشركة .

أولا: التأثير على معدل استهلاك الغذاء و الماء و نسبة الزيادة في الوزن إلى وزن الجسم و القيمة الغذائية

تبين من نتائج الدراسة عدم وجود فروق معنوية في كمية المياه المستهلكة و في كفاءة التحول الغذائي بينما كان هناك فروق معنوية سالبة في كميات الغذاء المستهلك وفروق معنوية موجبة في معدل الزيادة في الوزن في الحيوانات المعاملة.

ثانيا: التأثير على خواص الدم:

تبين من نتائج الدراسة

- عدم وجود فروق معنوية في معظم المتغيرات الهيماتولوجية بين المجموعة الضابطة ومجاميع المعاملة ٥ ، ١٠ ، ٢٠% بينما ظهرت فروق معنوية موجبة في عدد كرات الدم البيضاء
- عدم وجود فروق معنوية في مستوى البروتين الكلي ، الجلوبيولين ، الألبيومين ، الجلوكوز ، اللبيدات الكلية ، الليبوبروتين عالي الكثافة وفي نشاط إنزيمات الفوسفاتيز القاعدي ، الألفا أميليز و أسبرتيت أمينو ترانس فيريز.
- ظهرت فروق معنوية سالبة في مستوى البيليروبين ، الكولسترول ، الجلسريدات الثلاثية ، الليبوبروتين منخفض الكثافة ، الليبوبروتين شديد الانخفاض في الكثافة ، الفوسفاتيز الحامضي و الثيوباربيتيوريك
- ظهرت فروق معنوية موجبة في نشاط إنزيم ألانين أمينو ترانس فيريز بين المجموعة الضابطة ومجاميع المعاملة ٥ و ٢٠ % بينما لم تظهر فروق معنوية بين المجموعة الضابطة ومجموعة المعاملة ١٠%

ثالثا: التأثير على الوزن النسبي للأعضاء

تبين عدم وجود فروق معنوية في نسب وزن الأعضاء الداخلية بالجسم (الكبد – الكلى).بينما ظهرت فروق معنوية سالبة في نسبة وزن القلب إلى الوزن الكلي

رابعا: التأثير على أنسجة الأعضاء الداخلية (الكبد – الكلى)

الفحص الميكروسكوبي لأنسجة الكبد و الكلى لم يظهر اختلافات جوهرية في خلايا الكبد و الكلى بين المجموعة الضابطة ومجموعات المعاملة حيث أشار الفحص الميكروسكوبي لخلايا الكبد أن الخلايا كانت طبيعية ولم يظهر بها أي تليفات وظهر الوريد المركزي بصورة عادية ولم يظهر به أي التهابات أو تقرحات بينما ظهر زيادة قليلة في خلايا كوبر وتمدد في بعض الجيوب كما ظهرت إلتهابات بسيطة في مجموعة المعاملة ١٠ %. بينما أشار الفحص الميكروسكوبي لخلايا الكلى إلى ظهور كبيبات الكلى بصورة طبيعية ولم يظهر بها أي ضمور في الأنابيب أو الخلايا وظهرت الأنسجة الخارجية والداخلية

الكربوهيدرات و البروتينات و انخفاض محتواها من الدهون وكلوريد الصوديوم . وقد تم دراسة خواص تلك المياه من حيث محتواها من المادة الصلبة الكلية ، والمواد العالقة والذائبة ،وقياس كمية الأكسجين الحيوي و الكيميائي المستهلك وتبين ارتفاع محتوى تلك المياه من المواد العالقة وارتفاع قيمة الأكسجين الحيوي و الكيميائي المستهلك.

تم إجراء تجارب لاستخلاص المادة العضوية الذائبة والعالقة في مياه الصرف الصناعي الناتجة عن مصنع النشا باستخدام نقطة التعادل الكهربي ودراسة الزمن الأنسب لترسيب تلك المواد بالجاذبية وقد تبين أن أنسب درجة حموضة لترسيب أكبر كمية من البروتينات هي ٤.٥ و تبين أن أفضل زمن لترسيب أكبر كمية من المواد العالقة هو ١٨٠ دقيقة ثم تم فصل الراسب بواسطة آلة الطرد المركزي. وقد كانت نسبة البروتينات المفصولة ٧٠ % من البروتينات الكلية بينما وصلت نسبة المواد العالقة ٩٥% من المواد العالقة الكلية.

تم تجفيف الراسب بواسطة البخار ثم تم تقدير محتواه من الرطوبة ، الكربوهيدرات ، البروتينات ، الدهون ، الألياف والرماد وكذلك تم تقدير محتواه من الفينولات والأفلاتوكسينات وقد تبين أن الرطوبة (١٢ %) ، الكربوهيدرات (٦٠.٥ %) ، البروتينات (١٦.٨%) ، الدهون (١.١٨%) ، الألياف (٣.٣٨%) والرماد (٦.١٢%) وكانت الفينولات (١.٤٩ مجم / جم) وتبين خلو الناتج من الأفلاتوكسينات.

للتعرف على القيمة الغذائية للناتج المستخلص المجفف تم إجراء تجربة على الجرزان معمليا حيث كان تصميم التجربة باستخدام ٤٠ من ذكور الجرزان من سلالة الألبينو (٢٠٠± ٥٠) جرام تم وضعها في أقفاص و تهيئة الظروف المناسبة من ماء وغذاء وتركت الحيوانات للتأقلم على البيئة لمدة ٥ أيام وقسمت إلى ٤ مجموعات عشوائيا : المجموعة الأولى وتمثل المجموعة الضابطة ، المجموعة الثانية تم إضافة المنتج الثانوي الجديد المستخلص من مياه الصرف الصناعي إلى العليقة القياسية المستخدمة في تغذية المجموعة الضابطة بنسبة ٥% ، المجموعة الثالثة تم إضافة المنتج المستخلص بنسبة ١٠%، المجموعة الرابعة تم إضافة المنتج المستخلص بنسبة ٢٠% وقد إستمرت التجربة لمدة ٨ أسابيع تم خلالها تقدير وزن الجسم ومعدل استهلاك الغذاء و الماء أسبوعيا كذلك تم تقدير معدلات النمو وكفاءة التحول الغذائي وفي نهاية التجربة تم ذبح الجرزان وتم جمع الدم من الشريان الأورطى وتم فصل ١ مللي تم إضافة الهيبارين إليه لإجراء الدراسات الهيماتولوجية. وتم جمع الدم في أنابيب وترك ليتجلط ثم تم استخدام الطرد المركزي ١٠٠٠ لفة لفصل السيرم ثم تم حفظه على درجة -٢٠ في الثلاجة ، وفي السيرم تم تقدير مستوى الجلوكوز ومستوى الدهون ومشتقاتها ووظائف الكبد والكلى و إنزيم الألفا أميليز وحامض الثيوباربيتيوريك ثم تم تحليل النتائج إحصائيا وكانت كالآتي:

الملخص العربي

الشركة المصرية للنشا و الخميرة و المنظفات إحدى الشركات التابعة للشركة القابضة للصناعات الغذائية ويقع المركز الرئيسى للشركة في منطقة السيوف بشرق محافظة الإسكندرية بجمهورية مصر العربية. تضم الشركة ٤ مصانع لإنتاج المنظفات و الخميرة والمواد الكيميائية و المواد المساعدة و مصنع النشا. والسعة القصوى لمصنع النشا هى ٣٠-٣٥ طن من النشا و النشا المعدل يوميا. والمنتجات الرئيسية هي أنواع مختلفة من النشا الصناعي، نشا الطعام و المواد النشوية و النشا المعدل الذى يستخدم فى الصناعات مثل صناعة المنسوجات. تنتج الشركة النشا من كسر الأرز عن طريق نقع كسر الأرز في الماء المضاف إليه محلول الصودا الكاوية المخفف داخل أحواض ثم يتم فصل النشا عن طريق آلات طرد مركزي ثم يجفف بواسطة البخار.

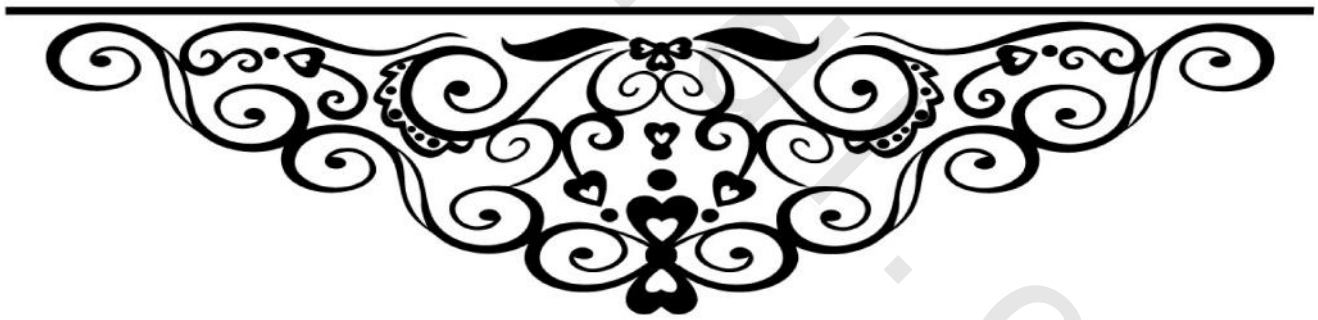
الهدف من هذه الدراسة هو خفض تكاليف الإنتاج من خلال تخفيض كمية استهلاك المياه في العمليات الصناعية . ودراسة إمكانية إعادة تدوير المياه ورفع عائدات الشركة باستخدام المواد العضوية المنفصلة من مياه الصرف الصناعى كإضافات لتغذية الحيوانات.

يستهلك مصنع النشا كميات كبيرة من الماء في مراحل الإنتاج المختلفة ، تم تقدير تلك الكميات المستهلكة يوميا خلال مدة الدراسة وتبين أن متوسط الاستهلاك اليومي هو ٥٥.٥ م^{٣} / طن كسر أرز وذلك أعلى ٤.٥ مرة من المعدل العالمي. وتبين من الدراسة أن الفاقد الأعلى من المياه كان في مرحلة الطرد المركزي والتي كان متوسط الاستهلاك اليومي لها ٣٢٥ م^{٣} / يوم منها ٣٠٠ م^{٣} عبارة عن مياه نظيفة تستخدم لتبريد آلة الطرد المركزي أثناء توقف تغذية الفراز بمحلول النشا (لبن النشا) والتي وصلت إلى ١٦ ساعة يوميا خلال مدة الدراسة وهذه المياه يمكن إعادة تدويرها لتقليل كمية المياه المستهلكة يوميا بالإضافة إلى وجود استهلاك عالي من المياه في عملية التنظيف الرطب و الغسيل نتيجة استخدام طرق بدائية وعدم استخدام مدافع الغسيل التي تعمل بضغط الهواء وكذلك وجود تسرب للمياه من أحواض النقع وصمامات التحكم وعدم وجود مصائد للبخار على خطوط البخار.

تم استخدام درجتين من كسر الأرز خلال فترة الدراسة (صفر – واحد) تبين من تحليلهما كيمائيا عدم وجود اختلافات جوهرية بين الدرجتين ولكن الفروق بينهم هي فروق فيزيائية فقط (حجم الحبيبة وكمية الشوائب)

تم أخذ عينات من مياه الصرف الناتجة عن مراحل الإنتاج المختلفة وتقدير محتواها من الكربوهيدرات ، البروتينات ، الدهون ، الألياف ، كلوريد الصوديوم و الرماد وتبين ارتفاع محتوى تلك المياه من المادة العضوية وخاصة

الملخص العربي



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جامعة الإسكندرية
معهد الدراسات العليا و البحوث
قسم الدراسات البيئية

الاستفادة من مخلفات صناعة نشا الأرز
في الشركة المصرية للنشا و الخميرة و المنظفات

رسالة مقدمة إلى
معهد الدراسات العليا و البحوث - جامعة الإسكندرية
ضمن متطلبات درجة الماجستير

في
الدراسات البيئية

مقدمة من

أشرف سعيد محمد رجب

بكالوريوس زراعة – قسم تكنولوجيا الأغذية

قسم الدراسات البيئية
معهد الدراسات العليا و البحوث
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٢٠١٥