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ECONOMIC EVALUATION OF AQUACULTURE SYSTEMS IN KAFR EL SHEIKH GOVERNORATE (EGYPT) (EL-MOHEET DRAIN AREA)

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Abstract

This paper investigates economic evaluation of Aquaculture systems used in fish farms located in the South of El-Burullus Lake, which produce 60% of the total aquaculture production and the impact of any changes in drainage water quality and quantity on the aquaculture economics. The study area included fish farms existing between pump station 7 and 8 and El-Moheet drain as well as in land fish farm and comparing with competing filed crop (rice and sugar beet). The study estimates variable cost, fixed cost, total operating costs (TOC), total return, net income and rate of return for every system. After carrying out a detailed socio-economic survey in the study area. The sample survey of 55 farmers representing fish farm and crop fields in the study area were used.

The study showed that fish farm production differs according to location, financial ability, personal experience, fish densities, aquaculture system, water quantity and quality, and management of water recycling technique. Aquaculture system based on artificial food and organic manure is considered the most popular aquaculture system represents 56% from the total samples of fish farms in north of El Moheet drain, followed by aquaculture system based on artificial food only represents 20%, and at last aquaculture system based on food factory wastes and aquaculture with wheat crop represents 12% from the total samples of fish farm in north of El Moheet drain.

On the other hand aquaculture system based on artificial food only is considered the most popular aquaculture system which represents 50%, followed by aquaculture system based on artificial

food and chemical fertilizers represents 28%, and in the end aquaculture system based artificial food and organic manure which represents 22% from the total samples of fish farms at the south of El Moheet drain.

Tilapia represents from 80% to 91% from the total fish densities used in the aquaculture in the studied area. Artificial food is considered the highest cost value which ranges between 30 % to 68 % which reflects the importance of finding untraditional alternatives of cheap fish meal for improving aquaculture economic.

Aquaculture with wheat cultivation system achieved the highest net income per feddan and the highest rate of return represents 55.4% in comparison to all systems followed by aquaculture based on artificial food and organic manure at fish farm located in El Moheet drain represents 38.8%.

The total operating cost of crop farming is considered less than that in aquaculture which reflects the reason of shifting from fish farm to cultivation.

The study included list of the main problems facing fish farmers: decrease quality and quantity of water, fish mass mortality in summer season, increase price of artificial feed, beside list of recommendations lead to improve economics of aquaculture at study area.

INTRODUCTION

Aquaculture is considered as the main source of fish production in Egypt, strategy of Ministry of Agricultural and Land Reclamation aims to decrease the fish gap in Egypt. Kafr El Sheikh Governorate produces about 600 thousand tons representing about 60% of the total aquaculture production in Egypt, concentrated in fish farms lying in the South of El-Burullus Lake.

Thus, it is important to improve and develop this sector to avoid any problems or constraints prevent their progress. Therefore, it is important to study the current economic and social situation for aquaculture as well as the impact of any changes in water quality and quantity on the economic situation of aquaculture.

Study problem:

1. What are the best fish farming systems in Kafr El-Sheikh Governorate?

2. What are the socio-economic factors affecting the income and the rate of return of these fish farms.

Objectives:

For answering on research problem, this study aims to achieving following objectives:

1. Develop a socio-economic characterization of different types of fish producers and fish production (techniques, stock density, feed quantity, type of fish, seasonal/over wintering, etc….).
2. Identify the problems & constraints facing aquaculture fisheries in areas (El Moheet drain and El-Burullus lake) and inland fisheries aquaculture north & south of El Moheet draine) Water quality, Quantity and marketing etc….).
3. Understanding why the switch happens between aquaculture and agriculture (sugar beet, rice) in that area.

Methodology:

- Structured socioeconomic survey of different aquaculture systems & agriculture area.
- The net income and rate of return were estimated after calculating total cost and returns from each of the aquaculture system and field crops.

Define Study area:

Lake Area (between pump station 7, 8 and El Moheet drain), inland fish farm (Kafr el Sheikh) and agriculture area.

Study Sample:

Structured surveys of individual households where conducted with farmers of aquaculture & field crops to collect data. The study sample consisted of 55 respondents (43 were fish farmers & 12 were dependent on Agriculture)

random samples were taken from fish farmers from El Moheet drain to El-Burullus Lake, and from fish farmers and farmers of field crops from El-Moheet drain to Abou Moustafa canal. Mobile phones with GPS function were used for the survey to record all the points surveyed.

A- 25 questionnaires covered the fish farm which lies between pump station 7, 8 and north El Moheet drains).

B- 18 questionnaires covered the fish farms lies south El Moheet drainage canal.

C- 12 questionnaires covered the agriculture area (Sugar beet, rice) south El Moheet drainage canal.

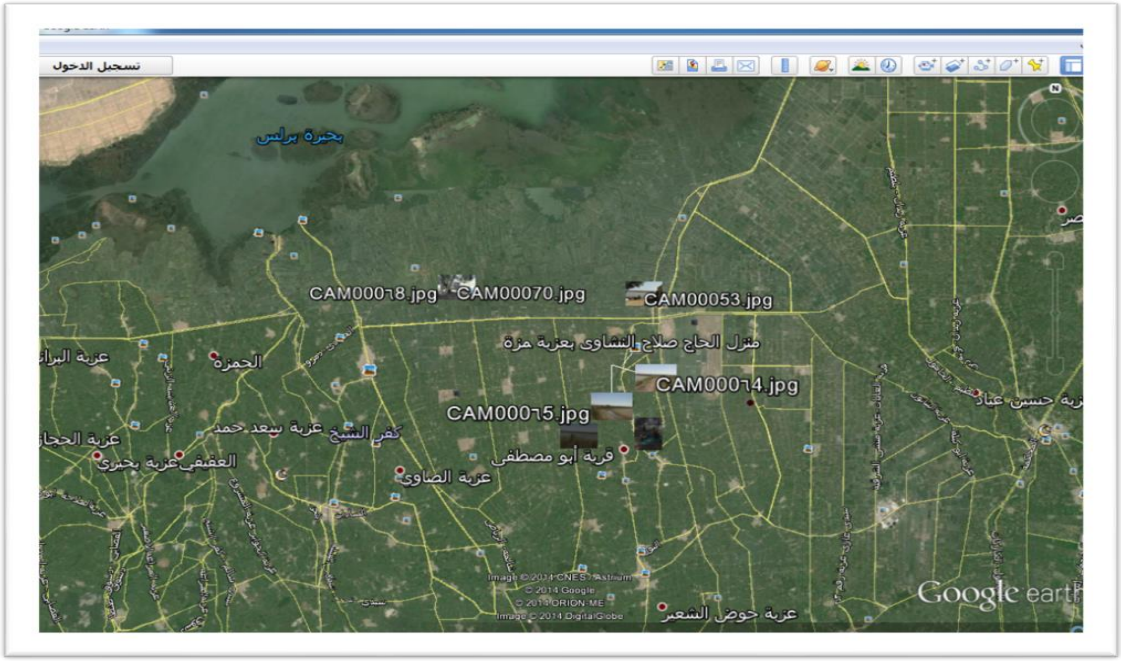

Figure 1. Fish farms location Map.

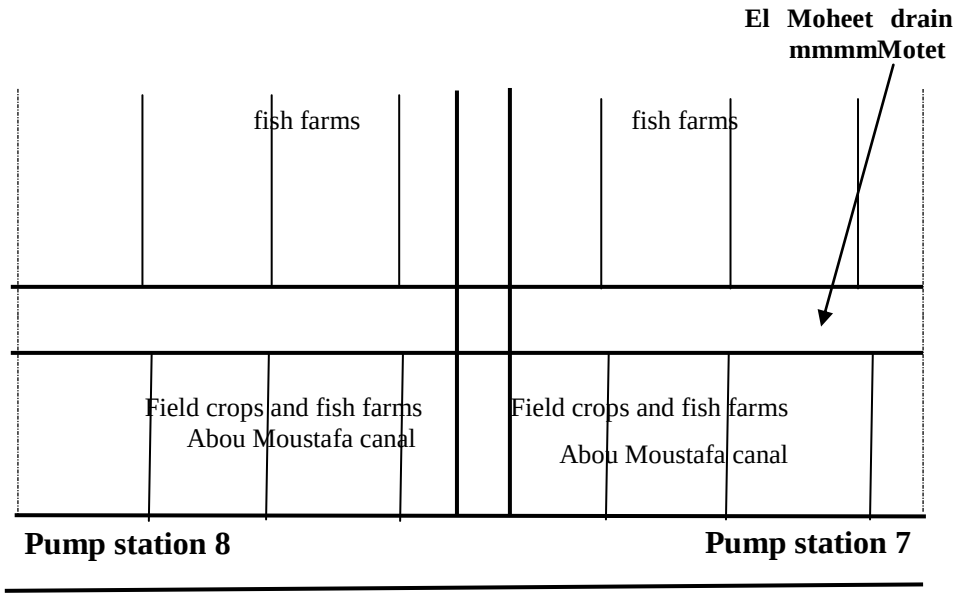

Figure 2. Study Area El-Burullus Lake.

Table 1. The Sample Distribution between the different aquaculture Systems in north of El Moheet drain*.

Aquaculture Item	Wheat crop	Artificial food & Organic manure				Artificial food only		Food factory waste	Total
Place of Questionnaire	Pump station No7	Burullus Lake	El Moheet	Pump station No7	Pump station No8	Pump station No7	Pump station No8	Pump station No8	
No of Questionnaire	3	1	2	7	4	3	2	3	25
No of Questionnaire per aquaculture system	3			14			5	3	25
% Per Aquaculture system	12			56			20	12	100

*** Source: Collected and calculated from the questionnaire**

Table 2. The Sample Distribution between the different aquaculture Systems on South of El Moheet Drainage canal.

Aquaculture Item	Artificial food & Organic manure	Artificial food only	Artificial food & chemical fertilizers	Total
No of Questionnaire per aquaculture system	4	9	5	18
% Per Aquaculture system	22	50	28	100

* Source: Collected and calculated from the questionnaire.

Table 3. Economical Evaluation of Aquaculture is based on Artificial Feed and Organic Manure System (Per Feddan).

Items	Fish Farm of Pump Station 8	% of (TOC)	Fish Farm of Pump Station 7	%of (TOC)	Fish Farm of El Moheet	%of (TOC)	Fish Farm of El Burullus Lake	% 0f (TOC)
1-Variable costs								
Fry & Fingerlings	1300	3.1	3000	5.4	4453	11.3	1400	5.7
Artificial Food	25875	62.3	37450	67.1	16800	42.7	13500	54.5
Organic Manure	3150	7.6	400	0.7	3500	8.9	1167	4.7
Chemical Fertilizer	---------	--------	250	0.4	---------	-------	---------	--------
Fuel & energy	1000	2.4	500	0.9	2000	5.1	1000	4.0
Annual maintenance	800	1.9	860	1.5	1000	2.5	700	2.8
Equipment	350	0.8	150	0.3	170	0.4	200	0.8
Labor cost	600	1.4	860	1.5	2000	5.1	400	1.6
Harvest & Transportation	800	1.9	1180	2.1	1260	3.2	750	3.0
Commission	2200	5.3	2100	3.4	2185	5.6	1475	6
Others	153	0.4	180	---	166	0.4	100	----
Total variable costs	36228		46930		33534		20692	
2-Fixed Cost								
1-Rent Value	2000	4.8	5000	9.0	3000	7.6	2000	8.0
Depreciation	580	1.4	200	0.4	250	0.6	450	1.8
Interest	2716	6.5	3649	6.5	2575	6.5	1619	6.5
Total Operating cost (TOC) L.E	41521	100	55779	100	39359	100	24762	100
Total Return L.E	44000	-----	70000	-----	54630	------	29500	----
Net income L.E	2479	-------	14221	-----	15271	--------	4738	-----
Rate of Return %	6	--------	25.5	-----	38.8	--------	19.1	------

* Source: Collected and calculated from the questionnaire.

RESULTS AND DISCUSSION

1- North El-Moheet Drain Area:

A. Aquaculture system depends mainly on artificial food and organic manure.

The aquaculture system based on artificial food, organic manure is considered the most popular in that area represents 56% of the total samples, it depends mainly on using system densities of (in average) Tilapia, Grey mullet and *Liza ramada* fingerlings with rate of about 12 thousand, 1 thousand & 2 thousand per feddan accordingly. (Tilapia represents 80% from the total densities of fingerlings) and fish farming cycle is started from April to November).

The variable cost in Table 3 includes the following: cost of fry and fingerlings, artificial food, organic manure, chemical fertilizer, energy, pond maintenance, labour, harvest, transportation & commission. The fixed cost includes rent value, depreciation and interest. The total cost was estimated as 41521, 55779, 39359 and 24762 L.E per feddan, respectively. For the farms located at pump station No.8, pump Station No.7, El Moheet drain and El-Burullus Lake. The net income was the highest for the El-Moheet area due to less money spent on artificial feed. The rate of return was also highest for this area.

B. Aquaculture system based on artificial food only.

The aquaculture system based on artificial food only based on using densities of Tilapia, Grey mullet and *Liza ramada* fingerlings with rate of about 14 thousand, one thousand and 1.5 thousands per feddan accordingly. (Tilapia represents about 85% from the total densities of fingerlings and the fish farming cycle is started from April to November).

Table (4) indicates that the cost of artificial food represents 68% and 60% of the total operating costs in the fish farms affiliated to Pump Station No.

7 and No. 8, respectively. The total variable cost was high for those farms surveyed near Pump Station No.7 (61565 LE per feddan) due to large quantity of artificial food used. The rate of return of fish farm affiliated to Pump Station No. 8 was higher (25%) than the fish farm affiliated to Pump Station No. 7 (about 16%) because of the increasing cost of artificial food in this area.

Table 4. Economical Evaluation of Fish Farm based on artificial food only (Per Feddan) for Pump Station 7 and 8.

Items	Fish Farms of Pump Station 8	% of (TOC)	Fish Farms of Pump Station 7	%of (TOC)
1- Variable Costs				
Fry & fingerlings	8300	15.8	6050	8.5
Artificial Food	31500	60.0	48400	68.0
Fuel & Energy	1500	2.8	700	1.0
Annual Pond Maintenance	1000	1.9	680	1.0
Equipment Maintenance	200	------	160	-----
Labor	600	1.1	655	0.9
Harvest &Transportation	1000	1.9	750	1.1
Commission 5%	2962.5	5.6	4120	5.8
Other	100	-------	50	-------
Total Variable Cost	47162.5	89.5	61565	86.4
2-Fixed Cost- Rent	2000	3.8	4800	6.7
Depreciation	70	----------	200	---------
Interest	3446	6.5	4659.6	6.5
Total Operating cost (TOC)	52678.5	100	71224.6	100
Total Return L.E	59250	--------	82400	---------
Net income L.E	6571.5	---------	11175.4	----------
Rate of Return %	25.6	----------	15.7	----------

* Source: Collected and calculated from the questionnaire

C. Aquaculture system based on waste of food factories and organic manure.

The aquaculture system based on waste of food factories and organic manure depends mainly on using densities of Tilapia, Grey mullet and Liza ramada fingerlings with rate of about 12 thousand, one thousand and 1.5 thousands per feddan respectively. (Tilapia represents about 83% from the total densities of fingerlings and fish farming cycle started from April to November).

This aquaculture system depends on waste of food factory like wheat bran, yellow corn crush, etc. Farmers who practice this system are mainly close to Pump Station No. 8. Table (5) indicated that fish feed represented the highest percent (30%) of the total operating cost followed by organic fertilizers (approximately 25%). Net income for the system was estimated as 8086 L.E per feddan with rate of return 20%.

D. Aquaculture system with wheat cultivation.

The aquaculture system with wheat cultivation depends mainly on producing fish in summer (from April to November) and Wheat crop (from November to April). For producing fish, they use densities of Tilapia, Grey mullet and *Liza ramada* fingerlings with rate of about 13 thousand, one thousand and 1.7 thousands per feddan respectively. Tilapia represents about 83% from the total densities of fingerlings and fish farming cycle started from (April to November).

Table 5. Economical Evaluation of Fish farm based on Waste of food factory (Wheat brain, Yellow corn crush &Organic manure).

Items	Value (L.E.)	% of(TOC)
1-Variable Costs		
Fry and fingerlings	7000	17.0
Food waste	12000	30
Organic fertilizers	10000	24.7
Fuel & Energy	600	
Annual pond Maintenance	500	
Equipment Maintenance	200	
Labor	2400	6.0
Harvest & Transportation	1000	2.5
Commission	1940	5.0
Other	----------	-------
Total Variable Cost	35640	88.0
Rent	2000	5.0
Depreciation	130	
Interest	2643.9	6.5
Total Operating Cost (TOC) (Variable+ Fixed, L.E.)	40413.9	100
Total Return L,E	48500	
Net income L.E	8086.1	
Rate of return %	20%	

* Source: Collected and calculated from the questionnaire

In this aquaculture system farmers use fish ponds for wheat cultivation during winter season when the fish farming is nearly stopped. After harvesting wheat crop, fish farmers add organic manure to the fish pond and fill it with drainage water gradually and transfer fingerlings in May. This system produces two products in one year so it saves liquid money for the fish farmer and achieves high economic efficiency.

This system is mainly found close to Pump Station No.7 and El Moheet drain area. Table (6) indicated that 43% of the total cost stand for artificial food, about 11% for rent value, about 10% for fries and fingerlings about 8 % for organic manure, and about 7% for trader's commission. The system achieved

the highest net income (about 26,000 LE per feddan) as well as the highest rate of return (55.4%) compared to other systems.

Table 6. Economical Evaluation of Aquaculture & Wheat cultivation /Feddan.

Items	Value/LE	% of (TOC)
1-Variable Costs		
Wheat Seeds	155	
Chemical Fertilizer	350	
Labor cost	300	
Plowing	280	
Harvest	288	
Irrigation	500	
Yearly pond maintenance	1000	2.1
Fingerlings	4450	9.6
Artificial Food	20000	43.0
Organic Manure	3600	7.7
Labor	1200	2.6
Chemical Fertilizer	-------	------
Fuel & Energy Cost	700	
Equipment Maintenance	1000	2.1
Harvest & Transportation cost	700	
Trader Commission 5%	3300	7.1
Gross Promoters	-------	
Total Variable Cost L.E.	37823	
2-Fixed Costs	5000	
Rent Value		10.7
Depreciation cost	650	
Interest	3043.1	6.5
Total fixed Cost L.E.	8693.1	
Total Operating Cost (Variable + Fixed)(TOC)	46516.1	100
Total Return/ Feddan, L.E	66000	
Total wheat Value	6300	
Total Return (Fish + Wheat)/ feddan, L.E.	72300	
Net Return L.E	25784	
Rate of Return %	55.4%	

* Source: Collected and calculated from the questionnaire .

2- The south of El-Moheet Drain Area:

A. Aquaculture system based on artificial food and organic manure.

The aquaculture system based on artificial food & organic manure use densities of Tilapia, Grey mullet, *Liza ramada* and catfish fingerlings with rate of about 15 thousand, one thousand, 8 hundred and 7 hundred per feddan accordingly. Tilapia represents about 86% from the total densities of fingerlings and fish farming cycle started from (April to November).

Results in Table (7) indicate that fish food represents 64% which is considered the highest cost item of the total cost followed by the rent value (about 9%). Net return and rate of return where estimated as about 9000LE/feddan and 15.5% respectively.

Table 7. Economical Evaluation of Aquaculture is based on Artificial Feed and Organic Manure System (Per Feddan).

Items	Value/LE/Feddan per annum	% of (TOC)
1-Variable costs	3300	
Fry & Fingerlings		5.8
Artificial Food	36000	63.6
Organic Manure	800	
Fuel & energy	1857	3.3
Annual pond maintenance	1000	1.8
Equipment maintenance	250	
Labor cost	720	
Harvest & Transportation	1000	1.8
Commission	2616	4.6
Others	--------	
Total Variable Cost	47561	
2-Fixed Cost		
Rent Value	5000	8.8
Depreciation	350	6.5
Interest	3704	
Total Operating Cost (Variable+ Fixed, L.E.)	56615	
Total Return L.E	65410	
Net income L.E	8795	
Rate of Return %	15.5	

* Source: Collected and calculated from the questionnaire.

B. Aquaculture system is based on artificial food only.

The aquaculture system based on artificial food only use densities of Tilapia, Grey mullet, *Liza ramada* and catfish fingerlings with rate of about 14 thousand, 5 hundred, one thousand and one hundred per feddan respectively. (Tilapia represents about 90% from the total densities of fingerlings and fish farming cycle started from April to November)

Results on Table 8 showed that artificial food represents the highest item of operating cost (64%), the total operating cost reached about 50 thousand LE/feddan, the total return was 56 thousands /feddan and the net return and rate of return were estimated at 5881 L.E /feddan and about 12% respectively.

Table 8. Economical Evaluation of Fish Farm based on artificial food only (Per Feddan).

Items	Value/LE/Feddan per annum	% of (TOC)
Variable Costs **Fry & fingerlings**	4600	9.2
Artificial Food	32000	64
Fuel& Energy	1500	3.0
Annual Pond Maintenance	1000	2.0
Equipment Maintenance	200	------
Labor	600	-------
Harvest &Transportation	1000	2.0
Commission 5%	1840	3.7
Other	---------	-------
Total Variable Cost	42740	85.3
2-Fixed Cost **Rent**	4000	8.0
Depreciation	100	----------
Interest	3278.8	6.5
Total Operating Cost (Variable& Fixed- TOC)	50118.8	100
Total Return L.E	56000	--------
Net income L.E	5881.2	---------
Rate of Return %	11.7	----------

Source: Collected and calculated from the questionnaire**.**

C. Aquaculture system is based on artificial food and chemical fertilizers.

The aquaculture system based on artificial food and chemical fertilizers use densities of Tilapia, Grey mullet and *Liza ramada* fingerlings with rate of about 15thousand, 5 hundred and 1thousand per feddan respectively. (Tilapia represents about 91% from the total densities of fingerlings and the fish farming cycle is started from April to November).

Table 9 Economical Evaluation of Fish Farm based on artificial food and chemical fertilizers (Per Feddan).

Items	Value/LE/Feddan per annum	% of (TOC)
Variable Costs **Fry & fingerlings**	4300	8.4
Artificial Food	32000	62.2
Chemical Fertilizers	85	
Fuel& Energy	1500	3.0
Annual Pond Maintenance	500	------
Equipment Maintenance	300	------
Labor	1440	3.0
Harvest &Transportation	1020	2.0
Commission 5%	2500	5.0
Other	---------	-------
Total Variable Cost	43645	85
2-Fixed Cost **Rent**	4000	7.8
Depreciation	400	----------
Interest	3363	6.5
Total Operating Cost (Variable& Fixed)(TOC)	51408	100
Total Return L.E	62500	--------
Net income L.E	11092	---------
Rate of Return %	21.6	----------

* Source: Collected and calculated from the questionnaire.

Results on Table 9 showed that the cost of artificial food represents about 62% of the total operating cost which is considered the highest cost item, the net income and rate of return were estimated at about 11 thousand

LE/feddan and about 22% respectively, so that the system achieved the highest net income and rate of return in comparison with the other aquaculture systems lies on south of El Moheet drain due to the quality of water (near sugar beet factory).

D. Economical Evaluation of Agricultural area

Table 10. Evaluation of Agriculture area (Sugar beet & Rice crop on south of El Moheet drain (LE/Feddan/Annum).

Items	Value/LE/Feddan per annum	% of (TOC)
Variable Costs		
1-Sugar Beet crop	690	6.3
Plowing, leveling& cultivation		
Seeds	120	-----
Chemical Fertilizers	1260	11.5
Irrigation	200	------
Scarifying	250	------
Pesticides	130	------
Harvest &Transportation	850	7.8
Total Variable Cost	3500	32
2-Rice crop		
1-Plowing & Leveling	300	
Seeds	300	----------
Cultivation of rice Nursery	200	------
Transplantation cost	750	6.9
Irrigation	300	--------
Pesticides	120	---------
Harvest	250	----------
Total Variable cost of rice	2220	20.3
Fixed Cost		
Rent Value	4500	41.2
Interest	715	6.5
Total Operating Cost(Variable		
+ Fixed) (TOC)	10935.4	100
Total Return (sugar Beet &		
Rice) L.E	13100	
Net Return L.E	2164.6	
Rate of Return %	19.8	

* Source: Collected and calculated from the questionnaire.

Results on Table 10 showed that the rent value represents the highest percent 41.2%, followed by the total variable cost of sugar beet (32%) and total variable cost of rice crop 20.3% of the total cost which is estimated at about 11 thousands LE/feddan represent about 20% of the total operating costs of fish farming in the same area. The net return of cultivated crops were 2165 L.E /feddan inspite of that it is considered lower than that in fish farming. The rate of return of cultivated crops reached about 20% which reflect the reason of shifting from fish farming to crop cultivation because of:

1- Contracting cultivation (with sugar factory).
2- Legal situation.
3- Low risk.
4- Cultivate rice crop assisting in leaching salts from the soil.

The Main Problems that fish farmer suffers from:

1- Decreasing of water quality and quantity gradually.

2- Phenomena of fish mortality in the summer season.

3- Increasing artificial food prices as well as fries and fingerlings of mullets, rent value, energy cost and commission of the trader which leads to increase the cost on the fish farmer.

4- The Bad Infra structure of the studied area mainly roads and electricity and drinking water.

5- The time of fish harvest for the most of fish farms is convergent that lead to the increasing the fish supply, so the price of fish decrease.

6- Ownership problems and difficulty to obtain subsidy loans.

7- Fish Farmer in the south of El Moheet drain suffers also from the illegal situation due to the fact that the area lies on South of El Moheet drain is allocated for plantation only.

CONCLUSION

- The study showed that fish farm production differs according to location, financial ability, personal experience, fish densities, aquaculture system, water quantity and quality, management of water circulation technique.

- Aquaculture system based on artificial food and organic manure is considered the most popular aquaculture system (represents 56% from the total samples of fish farms in north of El Moheet drain), as well as, aquaculture system based on artificial food only on south of El Moheet drain represents 50% from the total samples of fish farm in south of El Moheet drain.

- Tilapia density represents from 80% to 91% from the total fish densities used in the aquaculture in the studied area.

-Artificial food is considered the highest cost value which ranges between 30% to 68% of (TOC), which reflect the importance of finding untraditional alternatives of cheap fish meal for improving aquaculture economic.

- Aquaculture with wheat cultivation system achieved the highest net income per feddan and the highest rate of return in comparison to other systems represents 55.4%, followed by aquaculture based on artificial food and organic manure located in El Moheet drain represents 38.8%.

-The total operating cost of crop farming is considered less than the aquaculture activity which reflects the reason of shifting from fish farming to crop cultivation (it was the opposite of the past).

RECOMMENDATIONS

1- Provide fish farmers with subsidized loans, so as not to remain under the control of financiers.

2- Farmers should set up a fish farm union to defend their rights, works and solve their problems.

3- Fish farmers have to market part of their production as alive because of the price advantages which increase their profit.

4- Encourage fish farmers to cultivate wheat in the winter season and convince the fish farmers affiliated to Pump Station No.8 to use artificial food only to gain a high rate of return.

5- To overcome the problem of fish mortality in the summer season, the concerned research centers and organizations have to organize seminars during of April and May under supervision aquaculture experts.

6- The concerned research centers and organizations have to create a farm model for famers training on types of fish farming systems, applying the best recommendation concerning pond management, the suitable intensity of fingerlings, the composition of fish, and the good management of artificial food and aeration. It is considered as extension farm for all fish farmers in the area to improve their production.

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التقييم الاقتصادي لأنظمة الإستزراع السمكى في محافظة كفر الشيخ، جمهورية مصر العربية (منطقة مصرف المحيط)

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[١] قسم بحوث الإقتصاد السمكى؛ [٢] قسم بحوث صحة الأسماك ورعايتها؛ [٣] قسم بحوث الإرشاد السمكى؛ [٤] قسم بحوث الليمنولوجى – المعمل المركزى لبحوث الثروة السمكية – مركز البحوث الزراعية.

الملخص العربى

تهدف هذه الدراسة الى اجراء التقييم الاقتصادي لنظم الاستزراع السمكى المستخدمة في المزارع السمكية الواقعة جنوب بحيرة البرلس والتي تنتج ٦٠٪ من إجمالي إنتاج الاستزراع السمكي وأثر التغيرات في نوعية وكمية مياه الصرف على اقتصاديات الاستزراع السمكي بها. وشملت الدراسة المزراع السمكية الموجودة بين محطتى طلمبات٧ و ٨ والمصرف المحيط وكذلك المزارع السمكية الموجودة بمنطقة الزراعات النباتية جنوب المصرف المحيط ومقارنتها مع المحصول المنافس (الأرز وبنجر السكر) .وقدرت الدراسة التكاليف المتغيرة والتكاليف الثابتة وتكاليف التشغيل الإجمالية، إجمالي العائد، صافي الدخل و العائد علي رأس المال بكل نظم من النظم السابقة .

تم إجراء مسح اقتصادي اجتماعي على منطقة الدراسة، وتم أخذ عينة من ٥٥ من مزارعى الأسماك الذين يمثلون المزارع السمكية والمزارع النباتية في منطقة الدراسة. وأظهرت الدراسة أن إنتاج المزارع السمكية يختلف حسب الموقع، والقدرة المالية، والخبرة الشخصية، وكثافة الأسماك، ونظام الاستزراع السمكى، وكمية المياه ونوعيتها، وطريقة تدوير المياة.

وأوضحت الدراسة أن نظام الاستزراع السمكى الذي يعتمد على التغذية الصناعية والسماد العضوي هو أكثر نظم الاستزراع انتشارا حيث يمثل ٥٦٪ من إجمالى عينات المزارع السمكية في شمال المصرف المحيط، يليه نظام الاستزراع السمكى الذي يعتمد على التغذية الصناعية فقط حيث يمثل ٢٠٪ من العينات، وأخيرا نظام الاستزراع السمكي المعتمد على مخلفات مصانع الأغذية ونظام الاستزراع السمكي بالتكامل مع محصول القمح حيث يمثلان ١٢ % من عينة المزارع السمكية الواقعة شمال المصرف المحيط.

وقد أوضحت الدراسة أن نظام الاستزراع السمكى المعتمد علي التغذية الصناعية فقط هو النظام الأكثر أنتشارا حيث يمثل ٥٠٪ من اجمالي العينة يليه نظام الاستزراع السمكي المعتمد على التسميد الكيماوي والتغذية الصناعية ويمثل ٢٨٪ من اجمالي العينة وفي النهاية نظام الاستزراع السمكي المعتمد على االتغذية الصناعية والتسميد العضوي ويمثل ٢٢٪ من مجموع عينات المزارع السمكية الواقعة جنوب المصرف المحيط.

ومن ناحية آخري أخري أفادت الدراسة أن البلطي يمثل من ٨٠٪ إلى ٩١٪ من إجمالي كثافة الأسماك المستخدمة في نظم الاستزراع السمكى المنتشرة بمنطقة الدراسة. وتعتبر التغذية الصناعية هي أعلى بنود التكلفة حيث تتراوح بين ٣٠٪ إلى ٦٨٪ من اجمالي التكاليف مما يعكس أهمية إيجاد بدائل منخفضة التكلفة لتحسين اقتصاديات الاستزراع السمكى. وقد أوضحت الدراسة أن الاستزراع السمكى بالتكامل مع محصول القمح قد حقق أعلى صافى دخل للفدان وأعلى عائد علي رأس المال حيث بلغ ٥٥,٤٪ مقارنة مع نظم الاستزراع السمكي الآخرى، يليها نظام الاستزراع السمكى المعتمد على التغذية الصناعية والسماد العضوي في المزارع السمكية الواقعة على المصرف المحيط حيث بلغ العائد علي رأس المال ٣٨,٨ %.

وأوضحت الدراسة أن اجمالي تكاليف التشغيل الخاصة بزراعة المحاصيل النباتية أقل من تكلفة الاستزراع السمكى والتي تعكس سبب التحول من المزارع السمكية إلى الزراعة النباتية.

وتضمنت الدراسة قائمة بالمشاكل الرئيسية التي تواجه مزارعي الأسماك والتى من أهمها: إنخفاض جودة وكمية المياه، الموت المفاجئ للأسماك فى فصل الصيف، إرتفاع أسعار الأعلاف الصناعية، فضلاً عن قائمة بالتوصيات الرامية إلى تحسين اقتصاديات الاستزراع السمكي بمنطقة الدراسة.

وفي ضوء نتائج الدراسة فإنها توصى بأهمية قيام مزارعي الاسماك بإنشاء اتحاد تعاوني يعمل علي حل مشاكلهم ويدافع عن حقوقهم، وكذلك تشجيعهم علي تسويق جزء من انتاجهم في صورة حية لأرتفاع سعره وأهمية تنظيم ندوات ارشادية من الخبراء والباحثين بداية من شهر أبريل وحتي شهر مايو لتلافي ظاهرة موت الاسماك بالاضافة إلي تشجعيهم علي زراعة القمح شتاءاً وبالتكامل مع الاسماك والتي تؤدي إلي تحسين اقتصاديات الاستزراع السمكي في منطقة الدراسة.