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MANAGEMENT INFORMATION SYSTEM IN PANGASIUS FARMING

Management

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ABSTRACT

This paper was aimed to analyse and assess the types, sources and delivery methods of information relating to management information system in Pangasius farming.The results showed that there were 8 sources of the information relating to the fish health management. They are: (1) owned or self learning (pond/cage/pen), (2) extension agents, (3) private consultants, (4) input suppliers, (5) fish traders and processors/exporters, (6) mass media, (7) fisheries association, and (8) universities and research institutes. The most common sources to the fish farmers were the first, second, sixth, and the last institutions. For the surveyed services, the most important sources were the first, forth, and the last institutions. The sources of information are requested to be closer to the fish farmers and provide more useful information via appropriate methods of transferring the related information. At the current time, there are 6 different methods for delivery of information. For the fish farmers, these include: (1) direct experiment, (2) direct visit of other farms, (3) someone comes to the farm to instruct, (4) training and meeting, (5) mass media such as TV and radio, (6) reading materials. On the other side, the most appropriate delivery methods to the related services were: the second, forth and the last methods. The management information systems are required to be more frequent, as well as easier to understand and apply.

KEYWORDS

1. INTRODUCTION

Angiang province lies between Hau and Tien branches of Mekong river, where has rich potential for development of both agriculture and aquaculture with a cross network of 5,170 km of rivers and canals. Pangasius culture has become very common practice in An Giang since the successful propagation of this species (1998). Good physical conditions, more appropriate farming techniques and development of markets have been the main reasons for the province to share 152,508 tones of a total production of 315,000 tones of Pangasius fish of Vietnam in 2004. However, the farming of Pangasius fish in An Giang province and Vietnam has faced a number of various problems, especially the frequent occurrence of diseases, low growth rate, low survival rate and marketing problems in relation to the quality of products. According to different authors, the diseases on Pangasius fish tends to increase and the survival rate of fish has been increased from about 2-3% in 1998 to 15-20%, recently (Dung, cited from different sources, 2005). For the losses in farming Pangasius fish, diseases are considered one of the most important causes. There are different disease agents but the most common ones in An Giang are Bacillary necrotic in Pangasius (BNP), parasites, bacteria,…(Lien, 2004, and Dung, 2005, Khoi, 2008). Application of veterinay drugs including antibiotics, in prevention and treatment of fish diseases have brought about some good results. However, the spread of cultured areas and higher intensive level in farming activities also led to more concerns on the fish health management. These concerns are not only on the effectiveness of prevention and treatment but also on the economic efficiency of fish farming practices. Costs of prevention and treatment of diseases in pond farming of Pangasius covered about 3.8-10% of the total production costs per crop (Khoi, 2008).

2. RESEARCH METHODOLOGY

This survey was carried out September, 2009 using the designed questionnaires. Different groups of Pangasius farmers and related services were interviewed.

A total of 100 Pangasius fish farmers, including the individual farmers and FA members.

Information was collected, coded and entered into the computer for checking and analysied. Descriptive and comparative analyses were used.

3. RESULTS AND DISCUSSIONS

3.1 General information and the major trends of fish farmers

The average number of ponds per farms was 2.6 (2.3), ranging from 1 to 12 ponds, but the most common was 1 pond (36.7%), the next was 2 ponds (27.8%). The average pond area per farm was 6,263.1 m2 (13,639.9) with the most common one was about 3,000 m2. Comparing to 2 years before, most of the farmers did not change their fish cultured area or volume (80.3%) while the numbers of farmers increased and decreased their area or volume were 9.5% and 10.,2%, respectively. Results show that the farmers with increased area or volume are those obtained positive profit, but they also said that the level of profit was going down. A large amount of money lost was the most important reason that caused the farmers to decrease the area or volume of Pangasius culture

Most of the farmers had stable time for stocking fingerlings (88.3%), but 6.5% and 5.5% of them stocked fish later and earlier than before, respectively. Experience made the famers to stock fish with the expectation that the harvest is at the time when price of fish is high. Stocking duration increased with 19.9% of the total number of farmers due to the fluctuation in price of fish but some farmers wanted to keep fish with the expectation of a higher price. However, higher costs and bigger size of fish made the profit lower. More frequent occurrence of fish diseases and lower growth rate of infected fish also caused stocking duration longer. Besides, better experience and technical knowledge, as well as higher investment level and application of good feed and combination of different species helped to improve the growth of fish and made the stocking duration.

At the time of surveys, average stocking density varied depending on the farmers' point of views. There was 32.2% of the total number of farmers decreased their fish stocking density due to: (1) expectation to increase the fish yield and income, 60.0%, (2) better experience on water management, 35.0%. Increasing stocking density was associated with higher yield and costs but lower marginal profit per kg of fish and higher level of risk. There was 19.2% of the total number of farmers increased their fish stocking density. The reasons for decreased stocking density were: (1) failure of the previous crops caused by price fluctuation with 50.0% of the total number of farmers, (2) more frequent occurrence of fish diseases, 15.8%, (3) worse quality of water led to lower survival rate of fish, 10.5%). About 10.5% of the total number of farmers recognised that lower stocking density could help to improve the growth rate of fish while 7.9% of them considered that lower stocking density could made the management of water easier. Higher cost of fingerlings was also a difficulty brought about to 5.3% of the total number of farmers who had not much capital for fish farming. The farmers with decreased stocking density had unchanged fish yield and bigger size of harvested fish but lower fish yield and profit level.

The total number of farmers who increased the quantity of feed was 17.8% and the figure for decreased ones was 12.4%. Increasing the quatity of feed used helped to improve the survival rate anf yield of fish but lower level of profit margin due to higher FRC and feed costs. The reasons for increasing the quantity of feed were: (1) to improve growth rate of fish, 50.0% of the total number of farmers, and (2) to meet the requirement of increased fish stocking density, 42.9%. There was about 12.4% of the total number of farmers decreased the quantity

of feed because of (1) lower stocking density, 50.0% of the total number of cases, (2) lower price of fish, 42.9%, and (3) more infection of fish diseases and lower survival rate, 7.1%.

Medicines were less applied with 34.9% of the total number of farmers. About 32.6% of them had better information relating to fish quality management. Their experience in fish health management had been better (17.4%) that helped to a lower level of fish disease infection, then less application of medicines (17.4%). Reducing of farming level, especially loewr stocking density and combination of different species also helped to reduce the use of medicines and costs of fish health management (17.4%). The reasons for increase in application of medicines were: (1) more fish diseases and worse water quality, 79.4% of the total of cases, (2) more concerns on the prevention of diseases (11.8%), and higher stocking density made more concern on fish health management (8.8%).

Worse water quality of the river or cannals was considered by 44.8% of the total number of farmers. This was commented to be one of the most important reasons for decreasing survival rate of fish as wel as high level of risk in both fish yield and profit. This, in turn, was resulted by the spontaneous expansion of fish farming and increased pollution of agricultural farming activities and wastes from living activities (85.7% of the total number of fish farmers). Other reasons were: inappropriate irrigation systems (8.9%); wastes from upstream (3.6%); especially the dead fish threw in the rivers (1.8%). However, about 6.9% of the total number of fish farmers said that they had better quality of water for fish farming because of their farm locates along the big river with good flows of water and not many ponds/ cages in the area. A better environmental management at local level in the area might be another reason.

Impacts of the most serious diseases on Pangasius/Basa fish

The results show that there **are 12 diseases on Pangasius fish in Angiang province, but 3 most frequent diseases are: (1) Bacillary necrotic in Pangasius (BNP) with 82.1% of the total number of farmers, (2) Haemorrhage disease (63.4%), and (3) Parasite in Pangasius (32.0%).** In general, the impacts of diseases on the reduction of fish production and average profit have been limited because of better technical knowledge and more experience of farmers on fish health management. However, a lower survival rate of fish was reported due to larger number of fish farmers, higher stocking density, and worse water quality. If the quality of public water is better, the survival rate of fish can be improved and that can help to save more money sent for fish health management.

1. Bacillary necrotic in Pangasius (BNP)
2. Haemorrhage disease
3. Parasite in Pangasius
4. Jaundice
5. Intestime damage
6. Pop-eye
7. Columnariss disease
8. Epizootic Ulcerative Syndrome (EUS)
9. Monogenean disease
10. Fish swimming around the front of cage
11. Swollen of kidney
12. Fungal disease

BNP occurred in 82.1% of the total number of Pangasius farms, of which group 1-full participants had the highest infected level (93.6%) and group 3-non-participants had the lowest infected level (68.9% of farms). In average, BNP was reported with 66.5% (34.5) of the total number of crops of Pangasius/Basa, Group 3-nonparticipants had higher level of the number of crops infected by BNP (71.933.2%) compared with other two groups. Group 1 had the smallest number of crops infected by BNP (62.734.8%).

If the crop was infected by BNP, then the number of ponds/cages of that crop infected by BNP was 64.7% (34.6) of the total number of ponds/cages. Group 3 had the highest level of infection (67.332.6%). When the pond or cage infected by BNP, the dead rate of fish was 17.2% (16.0) compared with the pond/cage that was not infected. But it was sPangasiusnge because the dead rate of fish was highest with Group 1 (20.417.2%) while that figure of Group 3 was lowest (15.316.8%). The fish size at harvest was also affected by the infection of diseases. If the fish were infected by BNP, they were harvested at the size about 6.6% (10.2) smaller than the case of not infected. Group 3 had the strongest reduction in the size of fish at harvest (-9.411,0%).

Table 3.2: Infected level and impacts of the most dangerous diseases on P. catfish

Description	Details	BNP	Haemorrhage	Parasite
Sample size		60	25	15
Methods to recognise (%)	Observation	62.9	100.0	92.9
	Other farmers	0.8	0.0	0.0
	Laboratory	1.6	0.0	2.4
	Operation	34.7	0.0	4.8
Proportion of crops was infected	Mean	66.5	77.0	63.5
	±	34.5	31.1	38.4
Proportion of ponds/cages was	Mean	64.7	73.0	58.6
	±	34.6	35.2	36.6
Death rate (%)	Mean	17.2	11.1	17.5
	±	16.0	14.3	23.4
Decrease in the size at harvest (%)	Mean	-6.6	-5.4	-5.9
	±	10.2	9.2	10.8
Decrease in fish (%)	Mean	-14.8	-10.3	-12.7
	±	13.8	14.4	18.2
Decrease in the profit (%)	Mean	-22.6	-12.3	-16.7
	±	21.0	15.7	20.7
General assessment on the fish health management (%)	Not good	20.2	19.3	14.3
	Medium	33.1	31.3	23.8
	Good	46.8	49.4	61.9

Source: Data survey, 2010

3.3.1Detail information relates to the production process

(1) *Fingerlings and stocking density:* "Stocking density" was considered much by 83.4% of the total number of farmers and 74.6% of them thought that this factor is important. "Size of fingerlings" was paid attention by 80.8% of the total number of farmers and 63.0% of them said that this factor is important. "Price of fingerlings" made the thinking of 68.9% of the total number of farmers and 45.5% of them said that this is important factor. Even though 81.0% of the total farmers thought that "Checking of the quality of fingerlings" is important but this activity was done by about 68.7% of them, only. In addition, "seasonality and weather" and "disinfection of fingerlings" were considered by more than half of the total number of farmers and more than 60% of them thought that they are important factors.

(2) *Feed and feeding:* To feed the fish, 83.4% of the total number of farmers paid their attention to "fish health" in order to change the feeding activities to reduce the impacts of over feeding, and 84.9% of them said that this is important. "Price of fish" at harvest was important to 65.7% of the total number of farmers and this took the consideration of 70.2% of them applied in order to reduce the feed costs. "Checking of feed" helps to manage the water quality and also to save the feed costs, therefore, 68.9% of the total number of farmers gave their eyes to this and 71.7% of them reported that this is important. "Fish size" was also important to about 73.7% of the farmers and considered by 68.2% of them. "Types and sources of feed" were important to 77.6% of the farmers but applied by 66.9% of them, only. "Price of feed", however, not made much concern to the farmers because 64.9% of them considered this factor and only 52.6% of them commented this is important. "Amount of feed and frequency of feeding" brought about attention to 62.7% of the total number of farmers and 58.1% of them said that this is important. The figures for "quality of feed" were 60.9% and more important, 74.4%, respectively. In addition, there were several other factors affecting farmers in terms of feed and feeding like "water quality and pond bottom", storage of feed, etc,.

(3) *Water management:* In this term, the farmers gave their concern most to "fish health" (70.9% total number of farms). The farmers' decision on water management is based on the behavior of fish. About 78.3% of the total number of framers commented that "fish health" was important factor for water management. For water supply, 65.2% of the total number of farmers considered "quality of water in the river or cannal". There was 69.7% of the total number of farmers thought that "quality of water in the river or cannal" is an important factor. "Seasonality and weather" was the factor that made attention to 63.6%

of the total number of farmers in order to forcast the coming evens, and 68.8% of them commented that this factor was important. "Water quality and bottom of pond" was the notice for about 60.3% of the total number of farmers, but 84.3% of them recognized the important role of this factor. In addition, "total amount/quantity of fish in pond.

(4) *Fish health management:* This is difficult and complex activity which is always considered by the farmers. In general, "external clininical signs" was paid attention by 98.7% of the total nuber of farmers in order to identify the diseases and to find out the appropriate prevention and treatment methods, and 89.7% of them said that this is important factor. However, for some specific diseases, the "internal clinical signs" was considers by 79.5% of the total number of farmers and 75.0% of them appreciated this factor. "Prevention" was applied by 79.5% of the total number of farmers and 80.5% thought that this is essential for fish health management. To identify the diseases by "screening" was given consideration by 78.8% of the total number of farmers due to most of the farmers are based on their experience, and this factor was commented important by 85.8% of them. After identifying the diseases, "treatment methods" was paid attention by 58.9% of the total number of farmers and this was crucial to 67.4% them. "Exposure/ susceptibility to disease" warned 55.0% of the total number of farmers and 62.8% of them said that this is important. In addition, "source of chemicals/medicines" and "mortality pattern" affected to 53.6% and 49.7% of the total number of farmers but 76.9% of them thought that these factors are important, respectively.

It is difficult to identify and to treat BNP, therefore, in order to manage this disease the farmers often considered "internal clinical signs" (91.1% of them). "External clinical signs" was the next factor which was considered by 63.7% of the total number of farmers and 73.8% of them said this is important factor. To prevent BNP was applied by 63.7% of the total number of farmers but 86.2% of them appreciated the prevention methods they were applying. They also considered "screening" to identify BNP (61.7%); "treatment methods" (46.6%); "mortality pattern" (45,9%); "source of chemicals/medicines" to assure the results of prevention and treatment applied to BNP (44.6%);...

The farmers recommented (i) to use medicines to prevent BNP (46.4%), (ii) to observe the clinical signs for a better water management (35.7%), (iii) to Pangasiusin the farmers more on technical knowledge, disease dianogsis and treatment (32.9%), (iv) to obtain better fingerlings (9,0%), (v) to use better feed and to apply better feeding activities (8,5%), (vi) to give more attention to the seasonality (2,1%), and (vii) to stock fish at a lower density (1,6%).

(5) *Harvesting and marketing:* The strong and annual fluctuation of fish price in recent years have been the key concern to 97.4% of the total number of farmers and 88.9% of them said that this factor strongly affect their profit. "harvest size and number of ponds" was considered by 84.8% of the total number of farmers and 72.8% of them thought that this is important. Because of the consumers via processing and export companies require better quality of fish, "health and quality of fish" was paid attention by 66.9% of the total number of farmers and 69.4% of them appreciated this factor. "Financial conditions" affected 66.9% of the total number of farmers and 46.9% of them thought that this is important factor. In addition, "type of conPangasiusct" was considered by 43.7% of the total number of farmers but it was essential to 62.5% of them.

3.3.2 Farmers' assessment on the sources of related information

In general, in order to conduct the pond culture, technical information can be obtained from different sources. About 95.4% of the total number of farmers was based on their owned experience while 4.6% of them were not experienced, only.

The number of farmers gave good assessment to their experience was 90.8% and that numbers for medium and not good were 7.8% and 1.4%, respectively. The farmers recognised that they have to learn by themselves more in the real life of the industry (75.0%), as well as to be trained more on grow-out techniques and prevention and treatment of the diseases more effectively (25.0%).

About 79.5% of the total number of farmers received related information from other fish farmers and 65.8% of them appreciated this source of information. However, 5.9% of them said that this source of information is not reliable while the remaining of 20.5% did not contact with other farmers. The need to receive and transfer related information between the farmers was recommedned by 62.5% of the total number of respondens in association with more reliable information (25.0%) and more applicable information (12.5%).

Information from technicians was received 64.9% total number of respondents but 44.2% of them did not believed this source of information. Fish farmers suggested that the technicians should contact them more frequently in oreder to update the information and obtain a better understanding of the industry (65.0%). The technicians were also asked for a better supply of information (15.0%) and having more experience with the fish culture and fish health management (10.0%).

Private consultancy is quite new to the fish farmers, therefore, only 25.8% of the total number of respondents received the related information from this source. But among receivers, there was about 24.3% gave good assessment while 56.8% said normal and 18.9% commented not good about this source of information. The farmers also recommended that the consultants should provide more suitable information (60.0%), update information provided to the farmers (20.0%), and this service should have their own laboratory to meet the requirement of the farmers (20.0%) .

Accompanied with the development of commercial farming is the importance of the suppliers of major inputs for fish culture such as seed, feed, medicines, etc., These input suppliers provide the related information in order to promote their products. About 60.3% of the total number of farmers said that the information provided by input suppliers is good. They also recommended that: (1) the farmers should select and filter the information from different input suppliers (42.1%); (2) to apply the suitable and applicable information, only (31.6%); (3) the input suppliers should not focus on the profit while forget the right of buyers/farmers (15.8%); and (4) the input suppliers should have good technicians who can come to visit and carefully check the real situation of the farms before guiding the farmers (10.5%).

The buyers/Pangasiusders of fish are very important to the fish farmers, however, the respondents said that the fish traders not gave much concern to the information provided to the fish farmers. About 24.5% of the total number of respondents received the related information from fish traders. Among the total number of farmers, 24.4% appreciated information from this source, 70.3% was normal and 5.4% was not satisfied. The information receivers of this source suggested that the fish buyers need to provide (1) updated information (50.0%); (2) more reliable and suitable information (37.5%); and (3) more information on fish health management aiming to improve the quality of fish (12.5%).

Mass media is the fastest, most common and more efficient to the whole. Up to 93.4% of the total number of respondents received technical information through this source and 48.9% of them had good assessment. The farmers' suggestions from given to this source of information were: (1) information on TV should be faster and closer to the real life of (45.5%); (2) more frequent spread of the related programms (40.9%); (3) need to check the correction of the information before broadcasting or printing (9.1%); (4) more information on the fish health management that help the farmers to prevent and to treat the diseases more effectively (4.6%).

Universities and research institutes have the training and research activities on aquaculture are the source of information for 53.0% of the total number of farmers and 50.0% of them appreciated this source. The farmers had several suggestions for this source of information: (1) faster and farmer-closer information (46,2%); (2) more information related to fish health management (30.8%); and (3) information should be clearer and easier to be understood by the farmers (23.1%).

3.3.3 Farmers' assessment on the methods of information delivery

Various information from different sources were received and directly applied by 73.5% of the total number of fish farmers, and then about 86.1% of them relied on this method. However, in order to applied this method well, the farmers need to read more materials, to receive more technical supports and to conduct direct observation more frequently (33.3%).

Direct visits of the other farms and demonstration sites to absorb the good experience and lessons are a good method for 56.3% of the total

number of respondents and 69.2% of them appreciated for. Like the above method, this one also requires the farmers reading and visiting more (50.0% of the total number of respondents). In addition, the farmers need to learn more using other methods (25.0%), and receive more support from different institutions in order to visit the right places and models or systems (25.0%).

Suprisingly when 22.5% of the total number of respondents met the technicians at their farms, revealing that the technicians not come to visit the farms much, but 47.1% of them appreciate this method. Technicians were recommended to visit the farms more frequently to have better understanding in order to provide more effectively technical advices (50.0%). In addition, the farmers are also encouraged to read more materials (50.0%).

Training and workshop and combination of both types were an effective method of information deliverry because 74.8% of them received information via these methods and 58.6% of them commented that this method is important. The Pangasiusining workshops need to be held more often (76.4% of the total number of respondents), and the trainers need to have better knowledge and experience (11.8%). The farmers also look for the capital supports in order to apply what was trained and suitable to them (11.8%).

3.3.4 The delivery of information via mass media (tivi, radio, newspapers, etc, …) is the most common method which was received by 87.5% of the total number of respondents but the quality of information needs to be considered because 49.2% of the total number of receivers said that this is a good method. Recommendations for an improvemnt of this method include: (1) the programs should be more practical and broadcast more frequently (82.3%), and (2) the programs should be longer than common (17.7%).

Delivery of information via reading materials such as books, posters, etc., was reported by 70.2% of the total number of farmers and 51.4% of them thought that this is a good way to transfer information. The readers commented that (1) information on the reading materials should be simpler and more practical in order to be easier for the farmers to understand (62.5%), (2) information should be more detailed or easier for application (25,0%), and (3) information needs to be updated more frequently (12.5%).

3.4 Assessment of the services relating to fish health mangement

A total of 81 persons working in the related services such as businesses and institutions in the Mekong Delta were interviewed. These were people with good educational level, no one was illiterate, 32.1% had secondary level, 33.3% had high school level, 16% fished vocational, and 18.5% with bachelor degree or higher. Most of the services are managed by male (96.7% with the seed suppliers and 77.8% of medicines and feed suppliers). These groups are middle of the information channels, they are both receivers and deliverers of the information relating to fish health management.

3.4.1 Assessment of the related services on the type of information

Pangasius catfish cultured in the Mekong Delta is often stocked at high densities and the yield is also high. However, high intensive level of farming may easily cause the pollution of water in the rivers or canals around the culture araes and lead to the good conditions for occurrence and spread of fish diseases. All of the 8 types of information relating to the fish health management were considered by 4 related services, but the most impressive ones should be: (1) fish health management, (2) feed and feeding, (3) water management, and (4) preparation of the ponds. The information on fish health manegement were essential to all services in both receiving and delivery. All of them recommended that fish health management should be done with all of the steps of the production process. This type of information was said to be important with 90-100% of the total number of respondents when they were receivers and 73.3-100% when they were deliverers of information.

Water management in the fish culture area was considered by most of the respondents (98.8%). It was said to be an essential factor with 80-100% of the total number of surveyed services when received and a66.7-100% when transferred.

Harvesting and marketing made sence to a large portion of the related services. However, the exception was 6.3% of the total number of traders and processors when they were deliverers of information and 11.8% of the total numbers of training/research/extension group both in terms of receivers and deliverers of related information. Table 3.4: Assessment of the related services on the types of information

Table 3.4: Assessment of the related services on the types of information

	Results	Unit	Pangasius ining, research, extension (N1=17)	Seed suppliers (N2=30)	Feed & medicine suppliers (N3=18)	Buyers, processors, exporters (N4=16)	Total (N=81)
1. Site selection	Total answers with Yes	n	12	26	5	16	59
	Important when received	%	83,3	57,7	40,0	93,8	71,2
	Important when transferred	%	66,7	42,3	40,0	93,8	61,0
2. Seed and seed stocking	Total answers with Yes	n	17	30	14	16	77
	Important when received	%	82,4	76,7	85,7	62,5	76,6
	Important when transferred	%	82,4	73,3	92,9	62,5	76,6
3. Feed and feeding	Total answers with Yes	n	16	30	16	16	78
	Important when received	%	93,8	83,3	100,0	100,0	92,3
	Important when transferred	%	93,8	80,0	87,5	100,0	88,5
4. Water management	Total answers with Yes	n	17	30	17	16	80
	Important when received	%	100,0	80,0	94,1	100,0	91,3
	Important when transferred	%	100,0	66,7	94,1	100,0	86,3
5. Health manag't of Pangasius s	Total answers with Yes	n	17	30	18	16	81
	Important when received	%	100,0	90,0	94,4	100,0	95,1

	Important when transferred	%	100,0	73,3	94,4	100,0	88,9
6. Harvest and marketing	Total answers with Yes	n	14	30	16	16	76
	Important when received	%	71,4	63,3	100,0	50,0	69,7
	Important when transferred	%	64,3	56,7	81,3	50,0	61,8

Source: Data survey, 2010

3.4.2 Assessment of the related services on the sources of information

Sources of information for fish culture and fish health management are diversified with the participation of 8 institutions which are identified in the following table. Two most important sources of information for all of the groups are: (1) owned experience: the total number of respondents was satisfied is 84.1% when receiving and 89.9% when transferring the information; (2) training and research institutions, the total number of respondents was satisfied is 62.9% when receiving and 60.0% when transferring the information. In addition, the input suppliers were highly appreciated by the group of feed and medicine suppliers (94.4% for receiving, and 83.3% for transferring information) while fisheries association was very important to the fish traders and processors (100.0% for both receiving and transferring information).

The related services had a number of suggestions for an improvement of the sources of information for fish culture and fish health management.

Phân tích trên cho thấy nguồn thông tin rất đa dạng, được hưởng ứng và đạt hiệu quả cao, nhưng vẫn còn một số thiếu sót cần bổ sung và hoàn chỉnh. The Pangasiusining and workshop should be organised more frequent with more practical and detail contents, as well as provide the updated information. Extension workers and private consultants need to visit the farmers more and to learn more from the successful farmers. Mas media is expected to provide the frequent programs that help the farmers to obtain a better information, especially on the quality of public water/environment, farming techniques and market information. The universities and research institutes were recommended to provide more and appropriate information on the prevention and treatment of fish diseases, especially in the case of application, not too much in theory.

Table 3.5: Assessment of the related services on the sources of information

	Results	Unit	Pangasiusining, research, extension (N1=17)	Seed suppliers (N2=30)	Feed & medicine suppliers (N3=18)	Buyers, processors, exporters (N4=16)	Total (N=81)
1. Owned learning (pond/cage)	Total answers with Yes	n	12	30	11	16	69
	Good when received	%	75,0	76,7	90,9	100,0	84,1
	Good when transferred	%	91,7	86,7	81,8	100,0	89,9
2. Extension Agents	Total answers with Yes	n	16	28	7	16	67
	Good when received	%	50,0	35,7	71,4	43,8	44,8
	Good when transferred	%	56,3	21,4	57,1	43,8	38,8
3. Private consultants	Total answers with Yes	n	7	12	2	5	26
	Good when received	%	71,4	25,0	0,0	20,0	34,6
	Good when transferred	%	57,1	25,0	100,0	20,0	38,5
4. Input suppliers	Total answers with Yes	n	14	30	18	16	78
	Good when received	%	35,7	46,7	94,4	31,3	52,6
	Good when transferred	%	28,6	46,7	83,3	31,3	48,7
5. Fish Pangasiusders, processors and exporters	Total answers with Yes	n	9	8	1	16	34
	Good when received	%	33,3	25,0	0,0	37,5	32,4
	Good when transferred	%	33,3	12,5	0,0	37,5	29,4
6. Mass media	Total answers with Yes	n	15	29	18	16	78
	Good when received	%	60,0	37,9	61,1	43,8	48,7
	Good when transferred	%	53,3	27,6	44,4	43,8	39,7

7. Fisheries association	Total answers with Yes	n	0	0	0	7	7
	Good when received	%				100,0	100,0
	Good when transferred	%				100,0	100,0
8. Universities, Research Institutes	Total answers with Yes	n	14	25	15	16	70
	Good when received	%	78,6	44,0	66,7	75,0	62,9
	Good when transferred	%	78,6	40,0	60,0	75,0	60,0

Source: Data survey, 2010

3.4.3 Assessment of the related services on the methods of information delivery

Pangasiusnsferring information requires the appropriate methods and skills. The following table shows that there are 6 methods to deliver the information in fish farming in the study area. The most appropriate methods are: (1) reading materials, (2) training/workshop and meeting, and (3) visiting the successful farm in order to learn the experience. In addition, the group of feed and medicines suppliers also appreciated the method of direct experiment.

Most of the recommendations were given to: (1) reading materials, need to be shorter and easier to understand, closer to the real life of the industry, (2) extension programs need to be organized more often with the updated information and presentation method that should be more attractive to the farmers and related services. Technical consultancy from the extensions and information from the mass media need to be more detail and frequent.

Table 3.6: Assessment of the related services on the methods of information delivery

	Results	Unit	training, research, fisheries extension (N1=17)	Seed production and service (N2=30)	Fisheries feed and medicine (N3=18)	Collectors and export processing (N4=16)	Total (N=81)
1. Direct experiment	Total answers with Yes	n	11	22	16	11	60
	Good when received	%	54,5	54,5	100,0	56,3	64,2
	Good when Transferred	%	27,3	45,5	93,8	50,0	54,3
2. Visit other farms directly	Total answers with Yes	n	14	24	5	14	57
	Good when received	%	57,1	66,7	80,0	92,9	71,9
	Good when Transferred	%	64,3	45,8	80,0	92,9	64,9
3. Someone comes to the farm to instruct	Total answers with Yes	n	5	11	1	2	19
	Good when received	%	60,0	27,3	100,0	0,0	36,8
	Good when Transferred	%	60,0	36,4	100,0	0,0	42,1
	Total answers with Yes	n	17	28	16	16	77
	Good when received	%	76,5	42,9	87,5	100	72,7
	Good when Transferred	%	76,5	28,6	75,0	43,8	51,9
5. Mass media (TV, radio)	Total answers with Yes	n	16	28	18	16	78
	Good when received	%	56,3	32,1	72,2	25,0	44,9
	Good when Transferred	%	62,5	25,0	55,6	25,0	39,7
6. Reading documents	Total answers with Yes	n	17	29	18	16	80
	Good when received	%	52,9	58,6	83,3	100,0	71,3
	Good when Transferred	%	58,8	48,3	94,4	100,0	71,3

Source: Data survey, 2010

4. CONCLUSIONS AND RECOMMENDATIONS

General trend in Pangasius culture in An Giang province and the Mekong River Delta is intensive farming and aiming to meet the increasing demand for a better quality and larger quantity of products, especially that of the international markets. Fish health management directly affects to the fish yield and quality, as well as production costs and profit level of fish farming practices. This study shows that three most frequent and serious diseases on Pangasius fish are: (1) Bacillary necrotic in Pangasius (BNP) with 82.1% of the total number of farmers, (2) Haemorrhage disease (63.4%), and (3) Parasite in Pangasius (32.0%). In order to manage the fish health, fish farmers obtained different types of information from a various number of sources via different methods of delivery.

Excluding the general information such as age, experience and type of farming (pond, cage, pen), the fish farmers gave their consideration to 8 types of information relating to: (1) site selection, (2) design and construction of pond/cage/pen, (3) preparation of pond/cage/pen, (4) fingerlings and stocking, (5) feed and feeding, (6) water management, (7) fish health management, and (8) harvesting and marketing. In order to improve fish health management, all of the 8 type of information are important to the fish farmers. On the other hand, the related services gave their consideration more to the pond reparation, feed and feeding, water management, and fish health management. The information is required to be more frequently updated, practical and applicable.

There are a number of recommendations obtained from this study that help to improve the supply of information relating to the fish health management:

(1) Better planning activities, especially to upgrade the irrigation systems to reduce the pollution in the concern culture areas. Monitoring and warnings of the environment is also important.

(2) The farmers should consider more about the suitable water source for site selection in associated with standard design and construction of the pond/cage/pen.

(3) Responsible agents need to carry out more strictly to check the quality of fries and fingerlings provided by seed suppliers. In addition, it is better if there will have specific regulations on the stocking density for each farming systems.

(4) More training on the integrated prevention and treatment of fish diseases in association with the appropriate application of medicines following the regulations. It should be better if these are combined with the encouragement of organic fish farming.

(5) Mass media needs to be invested and improved more in order to help transferring better information to the whole community.

(6) An improvement of the linkage between five parties will help to assure the successfulness of the whole industry development (sectoral managers, farmers, input suppliers, traders/processors/exporters, and universities/research institutes.

(7) More and in-depth studies need to be conducted in order to help finding out the effective solutions for prevention and treatment of this diseases. More and appropriate information relating to this disease is useful to a large community including the fish farmers and services who involved in Pangasius industry.

REFERENCES

1. Ministry of fisheries (2001-2005). Annual reports.
2. Division of Statistics of An Giang province (2005). Statistic year book, 2004.
3. Le Xuan Sinh (2005). Issues relating to a sustainable farming of Pangasius catfish in
4. Vietnam. Paper presented at the workshop on "Socio-economics of species for sustainable aquaculture farming". Hawaii-US, 17-20 Oct, 2005.
5. Khoi, L.N.D., Wijngaard, J. and C.H.M. Lutz, 2008, Farming system practices of seafood production in Vietnam: the case study of Pangasius small-scale farming in the Mekong River Delta, ASEAN Business Case Studies No 27, Center for ASEAN Studies and Center for International Management and Development Antwerp, p.72.
6. Department of Agriculture & Rural Development (DARD) of An Giang province (2001-2004). Annual reports.