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Solutions for Pangasius Quality Knowledge Management

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ABSTRACT

This paper focused on the current disease prevention and treatment knowledge of small Pangasius farming and the farmers' willingness to implement new farming systems to manage diseases and take a needed step in assuring their treatment and prevention quality. A knowledge management model which can help mapping knowledge and information in the conclusion was presented.

KEYWORDS: *Pangasius farmers, farming systems, quality management knowledge*

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1. INTRODUCTION

Pangasius was cultured in the Mekong Delta in Vietnam since the 1950s on a small scale. The farmers collected the fish larvae from the Mekong River during the early flood season. The larvae were nursed in small ponds and provided to local farmers. They stock larvae in the integrated farming systems which integrate livestock and fish production; and the fish were produced for local consumption. However, since the 1990s the Pangasius culture developed rapidly because of rising demand in foreign markets and improved production and management techniques like induced reproduction, feed quality, water management and pond design.

With respect to the quality management in fish production, processing and trade, problem, fish farmers have a limited culture in terms of using veterinary drugs and feeds for fish that cause chemical hazards. The number of agents who produce and trade veterinary for aquaculture as not been reported. Informal data and information show that about 800 types of veterinary drugs are now used in aquaculture but the local authorities cannot monitor all of them in terms of veterinary brands.

Fish safety, including health risks, antibiotic residues and microbial pathogens such as parasites are part of the quality standards which are becoming more severe. Antibiotic resistance is a serious problem for human global health and therefore antibiotics should be used in a responsible way. Smallholders face difficulties to control and assure quality for the export market because the disease management lacks traceability. This paper focusesed on the current disease prevention and treatment knowledge of small Pangasius farming and farmers' willingness to implement new farming systems to manage diseases and take a needed step in assuring their disease management quality.

2. Literature review

2.1. Fish quality control and quality assurance

According to Van der Spiegel et al. (2003) quality management of primary production consists of activities and decisions that control, improve and assure the primary process, which results in a certain production quality. In this research the focus lies on quality control and quality assurance. Smallholders and the Vietnamese government have little or no influence in export quality policies and quality design. The definition of Khoi (2010) is used to describe quality management.

Quality control is a basic activity of fish quality management, which has as an objective keeping human and technological processes and the product itself between certain acceptable tolerances (Luning and Marcellis, 2007). Implementing quality control means units of measurements have to be established for gathering data about the processes, establishing quality standards, measuring the quality or performance, identifying the gaps between standards and actual performance, and taking action in order to close the quality gap and improve the quality in the next batch of products. Improvement is a form of control in the control process, where attention is paid to structural causes and solutions (Khoi, 2010)

Quality assurance in particular is important for the agri-food industry since it has typical characteristics like safety risks, seasonal harvesting, heterogeneity of raw materials and complexity of supply chains, which put high demands on assuring product quality and food safety (Luning and Marcellis, 2007; Luning et al., 2002; Van der Spiegel et al, 2003). Quality assurance consists of setting requirements on the quality system, evaluating the performance of the quality system and organising changes which are necessary to assure the quality. The objective of quality assurance is to control the quality system, which consists of all activities to realise quality, and to provide evidence to the consumers and customers that the quality requirements will be met (Luning and Marcellis, 2007). In the case of Vietnamese smallholders, quality can be assured to consumers through the use of track records, so the input becomes traceable. Quality control is embedded in quality assurance, because control activities form the basis of assurance systems. For instance, in the HACCP quality system control points are used to guarantee food safety. The implementation of quality assurance systems in the agri-food farms is challenging due to the earlier mentioned characteristics of the agri-food sector. Raw food is often subject to rapid decay, and the heterogeneity of products with respect to quality attributes, such as the presence of antibiotics and other contaminants, the size and the colour of the product are difficult to control.

2.2. Knowledge and knowledge management

The concept of knowledge is a complex one. The differences between data, information and knowledge are often confusing. Data is content that is directly observable, for example, a fact or listings of the times and locations of markets to buy raw materials. Information is content that represents analyzed data. For instance, the location of a market is held far away, which makes it difficult to go for a farmer, so they have to go to another market closer to the farm. Knowledge is different from either of these. It is a more subjective way of knowing, and it is typically based on experiential or individual values, experiences, and perceptions. People use knowledge when they do not base their decisions on the available information only, but also on experiences from the past, intuition, ethic, and so on. For example: somebody knows that there are many taxis in town, but because it is a holiday many people want to travel by taxi. Based on an earlier experience the person will travel by train instead of taxi (Dalkir, 2005).

Nonaka and Takeuchi (1995) described the difference between tacit and explicit knowledge. The tacit aspects of knowledge are the most difficult to disseminate and these aspects are often referred to as know-how. This form of knowledge can only be passed on by training or obtained from personal experience. The understanding of language is a form of knowledge which cannot be learned from grammar rules alone and it takes more know-how to catch a fish than reading a manual only. Explicit knowledge, on the other hand, is the kind of knowledge which is or can be codified. It can be readily passed on to others and can be stored. The most common examples are procedures, manuals and documents. To conclude, knowledge is highly contextual and the result of learning, experience, adaptation, sharing information, and so on (Brouwers, 1993). Brouwers (1993) states that the knowledge in a rural peoples' group or community is the product of a long succession of experimenting to resolve agricultural, environmental, and social problems in a particular socio-cultural and agro-ecological context.

Knowledge management (KM) is a field that can be described as bipartite. The first is the knowledge sharing part (or first generation KM) and the second is the knowledge making part. Frederick Taylor states that "the knowledge sharing side of KM (1) is all about capturing, codifying, and sharing valuable knowledge, and (2) it is all about getting the right information to the right people at the right time." The creating and sharing of knowledge has been described as the second generation knowledge management. The mission for second generation knowledge management is the creation of new knowledge by people in organisations (McElroy, 2003).

In this research we only focus on the first generation of knowledge management. This is still the most applied form of knowledge management by organisations and businesses.

KM consists of three variables. These are (1) knowledge acquisition and application, (2) knowledge capture and/or creation and (3) knowledge sharing and dissemination (McElroy, 2003; Dalkir, 2005). For individual farmers the knowledge acquisition and application is very important, while organisations like the Fishery Association (FA) and governmental institutions like the DARD might have to focus more on the capturing of knowledge and the sharing of it with its members. Other possibilities of sharing are between farmers themselves. If there is a local knowledge sharing culture between farmers more farmers are able to obtain the right disease treatment and/or prevention possibilities. The creation of knowledge is done by individuals in universities and research centers but knowledge is also discovered through the experimenting by local farmers (e.g. Brouwers, 1993). These institutions have to disseminate the knowledge to the FA and farmers in order to keep fish disease prevention and treatment up to date.

In literature KM is split into two different approaches: the Humanistic approach and the Information Technology (IT) approach. The Humanistic approach believes that knowledge is the result of sharing largely tacit information and data between individuals, groups and organisations. This is done through training, workshops and the gaining of experience. The IT approach on the other hand believes that KM is more about the collection, storage, codification and the spread and application of information and data in an efficient manner (Gloet and Berrel, 2003). Both approaches are important for farmers to use because logically farmers need both practical and theoretical knowledge to effectively prevent and treat diseases.

3. Research results

During farmer interviews both independent and farmer association (FA) farmers declared to have enough knowledge to prevent and treat Pangasius diseases. Consistent to what experts stated, farmers' got their knowledge mainly from neighbours, vet shop technicians, television, training and experiences obtained through trial and error. FA farmers also get the monthly FA magazine. Differences between farmers are also present. One independent farmer showed some documents about disease prevention while the other farmer could not show any manual because he 'lost' it. No real differences are noticed between independent and FA farmers when comparing the knowledge acquisition. Therefore the best way to measure farmers' knowledge is to look at the knowledge application.

Smallholders' current knowledge about disease prevention and treatment is discussed in this chapter. Differences between independent and FA farmers are outlined and the conclusion shows which personal knowledge types will be applied into the KM matrix. Moreover we discuss if smallholders' knowledge of disease treatment and prevention is consistent with the needed standards.

Both farmer groups are using chemicals that are certified for use (Table 1). All six interviewed farmers used lime and chlorine once a week. Furthermore most farmers anticipate on sudden weather changes by adding additional vitamin C to the feed.

Certified or legal drugs are used by 75 percent of all farmers. More independent farmers are included in the 25 percent of farmers that are still using non-certified drugs. Out of 50 independent farmers 30 percent sometimes use non-certified drugs for treatment or prevention. This compared to 20 percent of the 50 FA farmers that use non certified drugs now and then. It is uncertain whether all farmers are speaking the truth about the use of illegal antibiotics. In most cases local government staff will accompany the interviewer and therefore it is difficult to value the outcomes of such delicate questions. The interviews with the six farmers gave some transparency though.

Table 1 Farmers perception about drug use

	N (Sample)	Yes	No	No opinion
Are certified chemical used for treatment	100	100,0	0,0	0,0
Are certified drugs used for treatment	100	75,0	25,0	0,0
Are drug track records being recorded	100	10,0	90,0	0,0
Are legal drugs are better than illegal	100	43,0	53,0	4,0

Differences in drug use are observed during the interviews. The differences are caused by farmer characteristics rather than FA membership. Independent farmer 1 mentioned illegal drugs are used because they are stronger. Common antibiotics are Florphenicol (legal) and Chloramphenicol (illegal). Chloramphenicol has not been used by the farmer since the last two years. However, if more Florphenicol is fed than recommended it will be more effective. From experiences the farmer believes the fish might heal faster. Still he knows about the recommended drug dosage. Independent farmer 2 always uses the recommended dosage stated on the package or recommended by the disease technician. Farmer 3 mentioned the risk of overdoses is too high. Due to experience he knows the Pangasius can turn into shock when overdoses are being given to the fish. Based on the number of fingerling per square meter the farmer decides if the dosage should be adjusted. When treatment is ineffective he will withdraw the drugs for a while and applies vitamin C or other resistance improving minerals. One farmer's pond was almost ready for harvest and, as a preventive measure; the farmer gave some (legal) antibiotics to the fish a couple of days before harvest. If you withdraw any antibiotics four weeks before harvest, the processing firm will be unable to find any residues. FA farmers 1 did not use illegal chemicals at all and worked closely with vet shop technicians. FA farmer 2 sometimes used more than was recommended by the technician. If an illegal drug is given to the Pangasius the FA farmer 2 estimates the dosage. If a combination of drugs are used the farmer just applies the recommended dosage. Although the farmer never experienced any overdoses in drug treatment, it is very difficult to estimate the right drug amount. FA farmer 3 gets vet shop technician's guidance. In the case of multiple diseases farmers combine drugs and mix them with the home made feed. Farmers do not combine more than two antibiotics together.

Only 10 percent of the farmers have drug track records. All of the users are FA members. Farmer interviews confirm this questionnaire result but even the three FA farmers did not have track records.

However drug track records are only available by ten percent of the farmers. Farmers that are using track records are all FA members.

The stocking densities of the farmers seem to be consistent with the PAD standards of 38 fish per square meter (Table 2). Independent farmers have a lower average per square meter than FA members.

Table 2 Pond stocking density per square meter (m2)

	N(Sample)	Average	Mean	Mode
Farmers	100	32,5	32	40
Traditional	50	30,5	32	30
FA member	50	34,7	32,0	40

While the stocking density of independent farmers on average is a bit lower than FA farmers, FA farmers agree with the theorem that a lower stocking density will decrease disease rate and impact (Table 3). This is a bit contradicting, but nevertheless FA farmers seem to conform to the recommended maximum PAD standards of <38 fish per m2.

Table 3 Lower stocking densities will decrease disease rate and impact

	N(Sample)	Yes	No	No opinion
Farmers	100	58,0	17,0	25,0
Traditional	50	54,0	18,0	28,0
FA member	50	62,0	16,0	22,0

The interviews show little difference between FA and independent farmers. Independent farmer 1 maintains a stocking density of 40 fish per m2. This is a bit higher than the standards recommend. The stocking density of independent farmer 2 is about 35 fish per square meter and hence under the recommended maximum. In the past the stocking density was higher but the farmer recognized that a lower stocking density leads to less diseases. Independent farmer 3 keeps the density under 30 fish per square meter. FA farmers 1 and 2 have stocking densities of 35 fish per square meter and stocking density. FA farmer 3 keeps a density of 40 fish per square meter.

4. Implications

For this result, a solution to improve the fish safety position of small Pangasius farmers may be collective action in the form of Producer Organisations (PO) (Francesconi, 2009; Bijman, 2007 in Khoi, 2010). Producer organisations can train farmers in disease prevention and drug use or disease treatment. Cluster outcomes were improved yields, less environmental impact, improved product quality, and better relations with stakeholders along the value chain. The organisation of smallholders in India have empowered small scale farmers, increased stakeholder involvement within the clusters and gives the opportunity for small scale farmers to meet the market's quality requirements (Umesh et al., 2009). Ruben et al. (2007; in Khoi, 2010) also explained that farmers can improve their bargaining power with their buyers, for example the processing firms, when forming producer organisations or clusters with multiple farmers.

If smallholders want to survive and produce for the export market in the future, a second option for farmers is to change their farm into a fingerling or fish fry producing farm. The advantages are that smallholders will receive a monthly income instead of one income in six months. The production time for fingerlings is only one month. Smaller fish also need less space so fewer ponds are needed in order to achieve scale advantages. The disadvantages are that not all farmers have the knowledge to produce fingerlings. Smallholders need training to learn more about the feeding dosage and other inputs.

A final solution is to produce for other markets with less quality standards. Emerging markets like Egypt and Russia want fillets of less quality, and enable farmers to produce for export. However, as mentioned earlier, demands in the export market are becoming more stringent. The question remains how long the quality standards will be at the same level in developing countries. Moreover this change will close the quality gap in the export market, but does not close the quality needs of the social environment. If farmers continue to produce in an unsustainable and harmful way, antibiotics are becoming less effective and the environment will become more polluted.

5. Conclusion

In conclusion, this paper is derived from the fact that Pangasius smallholders face difficulties in surviving the export market due to increasingly stringent standards concerned with health risks and sustainability. The quality of disease treatment and prevention needs to be controlled and assured as a part of the total quality demands for the exports market.

Major farmers' knowledge sources of disease treatment and prevention are the neighbour farmers and disease technicians. Also the media have an important role in providing information to farmers. A television program is used as platform for Pangasius experts to provide information. Many farmers watch the television program about farming practices and learn from it. FA farmers also mentioned the FA as a major source of information. Training sessions are organised by the private businesses, Universities and NGOs. Government strategic focus is to give extension to advanced farmers. These farmers are expected to share their knowledge with the other farmers. In the field research experts mentioned there is lack of capital and extension officers to effectively disseminate new policies and quality standards to every farmer. Results show that around fifty percent of the farmers per year get training. This will likely affect the knowledge of most farmers about new farming practices and better standards.

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