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# Aquaculture Risk Management

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## Overview

The farming of aquatic organisms, whether fish, shellfish, plants, or algae, is subject to a variety of risks. As in agriculture, these risks include disease, poor product quality, competition, equipment failure, and natural disasters — but specific to aquaculture are others, for example, water quality degradation and the competitive impact from capture fisheries. Knowledge of these risks, their severity, and how best to manage them, is critical for the success of your enterprise.

To begin with, we need to first define **risk** and **risk management**. In the most general terms, the USDA Risk Management Agency (RMA) defines **risk** as “the chance of something bad happening.” By **bad**, RMA refers to “an event or outcome that is adverse, such as a crop failure” — it is a relative term, in that “losing more money is worse than losing less money.” **Chance** implies a degree of “uncertainty that an adverse event will occur” and means that if “something **bad** is absolutely, positively, guaranteed to happen, there is no risk because uncertainty isn’t present.”

Since it is not possible to eliminate all risk from aquaculture or agriculture, you must do your best to minimize the impact that risks will have on the financial stability of your enterprise. In a business context, **risk management** is about reducing the cost of risk. Aquaculture, like other business endeavors, is entered into for financial gain; therefore, managing risks is critical for success. To understand risk management, you need to

understand the three important concepts summarized in *One-Minute Risk Management*.

Managing risk effectively requires that you have a sense of what risks you are likely to face and what the

## One-Minute Risk Management

### *What*

The effective risk manager assures financial solvency against the consequences of risk at the lowest possible cost.

### *How*

Understanding financial statements provides the foundation on which a sound risk management plan can be devised and appropriate risk management tools employed.

### *Guiding Rules*

- Do not risk more than you can afford to lose.
- Do not risk a lot for a little.
- Understand the likelihood and severity of possible losses.

Adapted from *Risk and Risk Management* (PA-1667-03), from Mehr and Hedges, *Risk Management in the Business Environment*, Irwin Press, 1963.

consequences of each will be when encountered — in other words, how much do you stand to lose? This concept, known as **risk assessment**, is a critical first step in developing a sound risk management plan. The goal of risk assessment is to quantify the value of each potential risk and determine the likelihood that it will occur. Once this information is known, you will be able to determine if a particular approach to managing that risk makes financial sense. It does not make sense to spend thousands of dollars to save a few hundred.

## **Risk in Aquaculture**

Generally, risks associated with aquaculture are similar to those facing agricultural enterprises and relate to components that can affect the aquacultural crop itself, whether it is disease, equipment failures, or unexpected competition. This discussion will be limited to just two major areas where you are likely to feel the effects of risk in aquaculture: production and marketing.

### ***Production Risks***

Due to the vast number of aquaculture species being cultured and the diversity of production methods, the focus here will be on categories of risk (i.e., disease) rather than specific risks (e.g., Viral Hemorrhagic Septicemia or VHS). Some of the more common types of production risks are disease, predation, natural events, water quality, and power outages or equipment failure, though these are by no means the only risks aquaculturists may experience. Risks due to disease, power outages, and natural events can result in catastrophic losses; others, like predation and poor water quality are more likely to result in decreased survival or poor feed conversion ratios. The severity of individual risks differs and will likely change depending on when each is encountered during the production cycle. Regardless of which potential risk becomes problematic, each has the same impact: an overall decrease in your production of a marketable quality product that then results in financial loss.

### ***Marketing Risks***

As with production risks, aquaculturists face marketing risks that are often species and system specific; therefore, broad categories of market risk are presented here. All too often, a lack of proper business planning can leave the producer asking the question, “I’ve Grown It, Now What?” (See NRAC Fact Sheet, 101-2008, “Planning for Success in Your Aquaculture Business.”) Other marketing risks include: product pricing, where the cost of production exceeds the available market price; the inability to

supply existing markets; competition from other production strategies, including capture fisheries as well as other culture technologies; competition from alternative commodities such as beef, chicken, or pork; or simply competition from other producers, either local, regional, national, or international. Like production risks that can reduce the quantity and/or quality of the marketable product and result in a financial loss, market risks can have equally dramatic impacts on your bottom line. If you can’t sell what you are producing for more than it costs to produce, you face financial loss.

## **Managing Risk in Aquaculture**

A number of options exist to manage aquaculture risk and for any one particular risk, there are generally many solutions available. Consider disease as an example: some producers might decide to implement an *exclusionary approach*, where the aim is to prevent the introduction of disease to their facility, while other producers may decide that *post-infection treatment*, where disease symptoms are treated after they appear, is a better approach. While both approaches can be effective, the better option will depend on how you respond to the three guiding rules of risk management presented above: (1) don’t risk more than you can afford to lose, (2) don’t risk a lot for a little, and (3) understand the likelihood and severity of possible losses. To effectively manage risks then, you must know something about the likelihood and severity of loss from each possible risk and then decide on how best to manage it (i.e., risk assessment). Options to manage risk in aquaculture include a wide range of techniques and approaches that can generally be grouped into two distinct categories, insurance and non-insurance options.

### ***Insurance Options***

One approach to managing traditional agricultural risk is crop insurance. Typically, crop insurance programs are intended to transfer risk from one party to another, generally away from the producer and to the insurance underwriter. Of course this comes at a price, namely, an insurance premium. Aquaculture commodity insurance in the U.S. has not yet become commonplace. The reasons for this mirror the complexity of the aquaculture industry itself, in that a vast number of species are being produced through a myriad of production methods. This industry diversity has made it difficult, if not impossible, to develop an affordable insurance product that is appropriate for all species or production methods. Despite this apparent hurdle, the USDA Risk Management Agency (RMA) is

investigating insurance options for aquaculture and does have other insurance programs that could provide aquaculture producers some protection from risk.

Currently, RMA has three insurance programs that would afford aquaculture producers some protection from risk, specifically, the Cultivated Clam Crop Insurance Pilot Program, the Adjusted Gross Revenue-Lite program (AGR-Lite), and the Noninsured Crop Disaster Assistance program. While neither of the two latter programs targets aquaculture specifically, both would protect an aquaculture producer from certain risks. For example, the AGR-Lite Program is intended to protect a farm's revenue when faced with natural disasters or market fluctuations, while the Noninsured Crop Disaster Assistance Program is intended to safeguard against low-yields, loss of inventory, or the inability to stock as a result of natural disaster. More information, including eligibility and reporting requirements for each of these programs, can be obtained directly from the RMA website ([www.rma.usda.gov](http://www.rma.usda.gov)). Conversely, the National Risk Management Feasibility Program for Aquaculture is a partnership between Mississippi State University and the USDA RMA and has begun to assess the feasibility of developing commodity insurance for four aquaculture species groups: catfish, baitfish, salmon, and trout. More information about the status of this program can be found online at [www.agecon.msstate.edu/aquaculture](http://www.agecon.msstate.edu/aquaculture). In addition to the USDA RMA insurance programs that are available to aquaculture producers, some private insurance companies (e.g., The Hartford International Agribusiness Group, The American Farm Bureau Insurance Services, Inc.) also provide crop insurance that can help protect aquaculture producers from loss. Consult with your local insurance agent to determine what coverage is available to suit your needs.

### *Non-insurance Options*

In some instances, non-insurance options to manage risk in aquaculture may provide a producer with a viable alternative to crop insurance. While, non-insurance risk management options are likely to be as varied as the very risks they are intended to manage, these too can be grouped together based on the type of risk encountered, namely production and marketing risks. While some concepts will overlap, others are unique to either production or marketing. Regardless of the specific risk they are intended to deal with, they all are intended to preserve the bottom line.

Management of production risks such as disease, predation, water quality degradation, and power outages, can be accomplished by a number of methods: (1) changing husbandry practices is one simple method that can

provide significant protection from some risks; (2) carefully observing animal behavior (e.g., fish off feed, erratic swimming) and/or monitoring key water quality variables such as dissolved oxygen, pH, and ammonia will provide sufficient warning that a problem is looming; (3) building redundancy into your operation (e.g., back-up generators, oxygenation systems) can mean the difference between an inconvenience and failure; (4) improving feed management can result in higher feed conversion ratios, better water quality, and ultimately reduced production costs; (5) employing stringent bio-security measures and/or the use of Specific Pathogen Free (SPF) animals can help to exclude disease from a culture facility; (6) taking proper precautions should a disease outbreak occur can significantly reduce the severity of any outbreaks by minimizing cross contamination; (7) knowing appropriate chemical and drug therapies can ensure that disease outbreaks are properly treated when they are encountered and can ensure that disease organisms do not become resistant to treatment — this is particularly important given the limited number of therapeutic drugs that aquaculturists are permitted to use, making the exclusionary approach to managing disease risks the best option.

Diversification of your production to include other species, categories of production (e.g., foodfish, baitfish, ornamentals, plants, sport fish) or production technologies (e.g., ponds, raceways, recirculating systems), and integration of production with other enterprises (e.g., aquaponics) may help alleviate some production risks. While these options will likely not be as easy to implement as changing husbandry techniques, they will also provide some protection from marketing risks, too, in that you will have additional products to bring to market.

Traditional agricultural marketing practices dictate that a producer is a price taker, not a price setter — this often holds true in aquaculture as well, where producers generally sell into commodity markets with similar products and try to compete on price alone. An alternative approach to offset the risks associated with this type of a marketing strategy is to create a unique identity that can help differentiate your product from others in an attempt to capture a higher consumer price (i.e., niche marketing). Options to achieve this goal include “branding,” where the product form does not necessarily differ from your competitors', but the brand association indicates to a consumer that your product is of superior quality or has other desirable characteristics (e.g., locally produced, all natural); creation of “value-added” products, where the original commodity is further processed to make it more appealing (e.g., vacuum packaging, smoking, breeding), and selling into alternative, often higher value markets (e.g., live, direct to retail, retail).

## Conclusions

All business involves risk — the best we can do is to minimize the impact that risks have on the financial stability of our operations. How we manage risk in aquaculture is almost as important as the risk itself. While any number of options may exist to manage each potential risk, each option has associated costs and benefits that you must weigh against the risk itself. Keep in mind the three guiding rules of risk management: (1) don't risk more than you can afford to lose, (2) don't risk a lot for a little, and (3) understand the likelihood and severity of possible losses prior to investment or initiating an aquaculture business. Whether you are new to aquaculture or an experienced producer, these rules should be second nature. Doing your homework, educating yourself about aquaculture production and marketing strategies, and remembering that aquaculture, as with other agricultural enterprises, is a business will help you manage the risks that lay ahead.

## For More Information

The National Risk Management Feasibility Program for Aquaculture website ([www.agecon.msstate.edu/aquaculture/](http://www.agecon.msstate.edu/aquaculture/)) and the USDA Risk Management Agency website ([www.rma.usda.gov/](http://www.rma.usda.gov/)) are first stops for investi-

gating risk management issues. USDA also has a fact sheet, *Risk and Risk Management* (USDA RMA Fact Sheet # PA-1667-03) that may be useful. Extension agents and specialists, university personnel or your state aquaculture association can help provide further information; a list of state aquaculture extension personnel is available on the NRAC website ([www.nrac.umd.edu](http://www.nrac.umd.edu)) or you can contact your local Cooperative Extension Office for an initial contact. Further information about aquaculture insurance programs around the world is available from *Review of the Current State of World Aquaculture Insurance* (FAO Fisheries Technical Paper No. 493. Rome, FAO. 2006. 92p).

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