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PRACTICAL APPLICATION OF BILATERAL EYESTALK ABLATION FOR PRODUCTION OF SOFT-SHELL RED SWAMP CRAWFISH AND WHITE RIVER CRAWFISH

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The crawfish molting cycle is controlled by hormones produced by paired organs called y-organs located behind and below the eyestalks and paired organs called x-organs located in the eyestalks. The y-organs produce the molting hormone called ecdysterone, a steroid compound. The x-organs produced a molt inhibiting hormone, a peptide compound. This hormone is stored in sac-like sinus glands near the x-organs.

Removal of both eyestalks at their bases is called bilateral eyestalk ablation. This removes the source of molt inhibiting hormone and induces intermolt crawfish to molt within 8-15 days when temperatures are 70-80° F. This applies to both red swamp crawfish, *Procambarus clarkii*, and white river crawfish, *Procambarus zonangulus*, the two Louisiana commercial species.

Bilateral eyestalk ablation is much more effective in immature crawfish than mature crawfish. Ablated mature crawfish attempt to molt but many die without freeing themselves from the old exoskeleton (shell). We do not recommend ablating mature crawfish at this time.

Turn-over time for red swamp crawfish and white river crawfish used in a conventional soft-shell crawfish system is roughly 40 days at 75-80° F. Thus, bilateral eyestalk ablation permits very dramatic increases in turn-over time. Economic projections show that the process can be cost-effective at success rates as low as 50%.

Size-increase at each molt is about 25% for ablated crawfish. It is less than 5% for unablated crawfish. Therefore, crawfish as small as 35-40/lb may be used for ablation and still produce a useable 25-30/lb product. Also, jumbo soft-shell crawfish can be produced when 15-20/lb crawfish are ablated!

Recommendations

Ablation Tools and Ablation

The eyestalks are located on either side of the head just behind the pointed rostrum. They are actually on the front of the body. As a result, a device that can grasp and cut the two simultaneously can remove them simultaneously.

Drs. Malone and Chen have fabricated an excellent ablation tool using a pair of common pliers—Stanley 84-092—by shaping and bending the two tips. The length of the pliers after modifications is approximately 14 cm (5.5 in) and the width of the modified tips is approximately 2 mm (0.08 in). This pair of pliers can easily be used to hold the two eyestalks of a crawfish and remove them simultaneously.

Curved forceps (tweezers) and curved manicure scissors can be used to remove the eyestalks. The scissors are preferable to the forceps. With forceps, only one eyestalk can be removed at a time by twisting it away at the base. The curved scissors cuts one eyestalk at a time, but the curve permits a continuous motion to pass to the other eyestalk, under the rostrum, and cut it. The modified ablation pliers are superior to either forceps or scissors in performing bilateral eyestalk ablation of crawfish.

System Management

We recommend use of a recirculating soft-shell crawfish system where water quality is maintained at the following levels: dissolved oxygen, over 3.0 parts per million (ppm); pH, 7.0-8.0; alkalinity, at least 50 ppm; ammonia, under 0.5 ppm; nitrite, under 0.5 ppm; and temperature, 75-80° F. Water level should just cover the backs of crawfish in the system. This permits them to easily catch floating feeds. Water flow should be adjusted so that the crawfish are able to move freely about the tray without difficulty. Uneaten feed and debris should be siphoned or drained away at least once a day.

Crawfish and Handling

Healthy, immature red swamp crawfish and white river crawfish react favorably to ablation. They may be mixed in a system. However, our experience has been that white river crawfish begin molting in large numbers roughly one day before red swamp crawfish do.

It is imperative that anyone using bilateral eyestalk ablation to produce soft-shell crawfish use only healthy crawfish. Seek out the best quality crawfish possible. It is best to take a test group and evaluate overnight mortality before filling a system. If mortality exceeds 5%, do not use crawfish from that source! Find another source. We hold crawfish for at least one day, preferably two days before ablating them. The crawfish should be fed during this holding period. They should be rejected if mortality exceeds 5%.

Mortality of "new" crawfish is apparently associated with the *Vibrio spp.* bacterium. Red swamp crawfish appear to be much more susceptible to this malady than white river crawfish. It is spread when healthy red swamp crawfish eat infected crawfish. Overnight mortality of 50-75% is common when there is a vibrio problem. That is why we advise screening crawfish to be used in soft-shell systems.

If possible, move crawfish in hard boxes rather than sacks but make sure that the boxes have drain holes in the bottoms. Standing water will kill crawfish.

We have had very poor success when ablating mature red swamp crawfish and white river crawfish. They become "trapped" in their old exoskeletons, often being unable to extract their claws from their old exoskeletons.

Temperature affects molting rates. Most crawfish molt in 10-12 days at 70-75° F and in 6-8 days at 75-80° F. As stated above, white river crawfish begin to molt before red swamp crawfish do. All crawfish are not at the same molt stage when ablated. There will be some that will molt within 5 days after ablation. This can be minimized if obvious premolt crawfish are not ablated. These should be set aside because they will molt anyway.

Roughly a day before ablated crawfish molt they will visibly "swell", with the carapace bulging upward and away from the tail. The exoskeleton will become very brittle. These swollen premolt crawfish must be separated from the other crawfish or they will be eaten as they molt, or soon afterwards.

Feeding

A good quality floating catfish feed (32%) is satisfactory for feeding ablated crawfish. Remember, water level must be low enough in the tray to permit the crawfish to easily catch the floating pellets. It appears that the crawfish should be fed at least every 6-8 hours. The amount should approximate at least one pellet per crawfish. Watch for uneaten feed after about 10-15 minutes to estimate whether or not enough feed has been added.

Crawfish begin to feed as soon as they are ablated. We spread dry soybeans in the tray before ablating the crawfish. The ablated crawfish will immediately begin to eat the soybeans even before they become soft. Some people have used dry feed corn for this purpose. We advise adding fresh soybeans (or corn) after feeding pelleted feed. This gives the crawfish something to eat before the next feeding. Dry peas and beans will also work, however, they are far more expensive than soybeans and corn.

Please note that a good quality, sinking, water-stable crustacean feed works fine for feeding ablated crawfish. Such feeds are difficult to locate and are much more expensive than floating catfish pellets. Furthermore, once the feeds have leached 15-30 minutes in a tray, the crawfish will not eat them! Thus, if one uses such water-stable sinking feeds for ablated crawfish, he/she should not feed more than the crawfish will eat in 15-20 minutes.

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