

*Director's
Digest*



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NEW SPECIES, TECHNIQUES CHANGE AQUACULTURE FEED DEMAND

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ABSTRACT

THE AQUACULTURE INDUSTRY IS MOVING NORTHWARD AS PRODUCERS THERE ARE FINDING THEY CAN PRODUCE HYBRID STRIPED BASS IN COLDER CLIMATES. HOWEVER, THE PRODUCERS ARE ALSO FINDING THAT, ALTHOUGH FEEDS ARE AVAILABLE, NONE IS EXACTLY RIGHT FOR THEIR USE. ANOTHER FACTOR CHANGING THE TYPE OF FEED AQUACULTURE PRODUCERS WANT IS THE SHIFT FROM POND TO CAGE PRODUCTION. THE FEEDS FOR CAGE PRODUCTION MUST BE MORE COMPLETE.

FISH FARMING COULD HAVE EXPLOSIVE GROWTH IN THE 1990s, CREATING THE NEED FOR NEW TYPES OF FEED RATIONS.

LAST YEAR ABOUT ONE-THIRD OF A BILLION POUNDS OF FISH WERE PROCESSED. SOME OF THOSE WERE FARM RAISED AND GRAIN FED. IN THE FUTURE, SPECIALISTS ARE PREDICTING, MORE OF THE FISH CONSUMED WILL COME FROM AQUACULTURE.

THERE ARE A NUMBER OF REASONS FISH PRODUCTION APPEARS READY FOR RAPID EXPANSION. FIRST, PER CAPITA CONSUMPTION OF SEAFOOD HAS STEADILY INCREASED

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TO A RECORD 15.9 LB. BY 1989 AND IS EXPECTED TO REACH 25 LB. BY THE YEAR 2000, ACCORDING TO LADON SWANN, AQUACULTURE SPECIALIST IN INDIANA AND ILLINOIS.

SINCE THE 1960s, AQUACULTURE EXPERIENCED ITS BIGGEST GROWTH IN CATFISH PRODUCTION. THE SOUTH HAS DOMINATED CATFISH PRODUCTION IN THE U.S. WITH MISSISSIPPI RAISING NEARLY 75% OF ALL FARM-RAISED CATFISH TODAY.

THE SECOND REASON FOR EXPANSION STEMS FROM A RELATIVELY NEW FISH SPECIES. WHILE CATFISH PRODUCTION STILL CAN EXPAND, THE LARGEST GROWTH IN AQUACULTURE COULD BE WITH THE HYBRID STRIPED BASS.

THE HYBRID WAS FIRST SUCCESSFULLY GROWN IN THE 1960s. THE HYBRID, WHICH IS ADAPTED TO COOLER TEMPERATURES THAN CATFISH, OPENS AQUACULTURE PRODUCTION TO THE MIDWEST.

THE HYBRID STRIPED BASS HAS AN EIGHT-MONTH GROWING SEASON IN THE MIDWEST, WHERE THE CATFISH HAS ONLY A SIX-MONTH GROWING SEASON.

PRODUCTION TECHNIQUES OFFER A THIRD REASON FOR GROWTH OF THE FISH INDUSTRY. SPECIFICALLY, CAGE CULTURE - RAISING FISH IN CAGES - IS MAKING MANY MORE PONDS SUITABLE FOR RAISING FISH. ALTHOUGH CAGE CULTURE HAS BEEN TRACED AS FAR BACK AS 2000 YEARS AGO, MORE MODERN TECHNIQUES ARE ATTRACTING FARMERS WHO ARE SEARCHING FOR ALTERNATIVE FARM METHODS. CAGE CULTURE HAS THE POTENTIAL TO GROSS \$4,000-6,000 PER SURFACE ACRE OF WATER FOR HYBRID STRIPED BASS AND CATFISH.

FEED RESEARCH

NEWER TECHNIQUES AND HYBRIDS DO NOT APPEAR WITHOUT CHALLENGES. ONE OF THE LARGEST IS FEED RATIONS. THAT IS PARTICULARLY TRUE WITH THE HYBRID STRIPED BASS. WHILE THE HYBRID HAS MANY DESIRABLE ATTRIBUTES AS A FARMED SPECIES, LITTLE RESEARCH HAS BEEN DONE ON NUTRITIONAL REQUIREMENTS FOR THAT FISH, SAID SWANN.

UNIVERSITY RESEARCH HAS BEEN INITIATED WITH THE OVERALL GOAL OF DEFINING DIETS FOR HYBRIDS. BY COMPARISON, TRADITIONAL RATIONS EXIST FOR CATFISH AND TROUT. THE REASON CATFISH AND TROUT DIETS DO NOT WORK WELL FOR HYBRID STRIPED BASS LIES TO A GREAT EXTENT IN THE AMOUNT OF PROTEIN IN THE FEED.

PROTEIN LEVELS OF THE FISH FOOD VARIES BECAUSE THE NATURAL DIETS OF THE FISH VARY. CHANNEL CATFISH ARE OMNIVORES; THEY NATURALLY EAT A VARIETY OF FEED. TROUT ARE CARNIVORES; PRIMARILY, THEY EAT SMALLER FISH OR INSECTS.

MOST OF THE FEED RESEARCH HAS BEEN CONDUCTED ON THESE TWO TYPES OF FISH. A GREAT DEAL OF THAT RESEARCH IS SPECIFIC TO THE AREAS WHERE CATFISH AND TROUT ARE GROWN.

PAUL B. BROWN, PROFESSOR OF FORESTRY & NATURAL RESOURCES AT PURDUE UNIVERSITY NOTED, "EVEN FOR CATFISH AND TROUT, NOT MUCH OF THE RESEARCH HAS BEEN CONDUCTED UNDER MIDWEST CONDITIONS OR FOR THE TYPES OF CATFISH OR TROUT MOST LIKELY TO BE RAISED IN THE MIDWEST".

AS A RULE, THE OPTIMAL PROTEIN CONCENTRATION FOR CATFISH IS 30-32%, AND THE OPTIMAL LEVEL FOR TROUT IS 40-45%.

MANY PRODUCERS OF HYBRID STRIPED BASS ARE FEEDING A 36% PROTEIN CATFISH FINGERLING DIET, WHILE OTHERS ARE FEEDING A 40-45% PROTEIN TROUT DIET," SAID BROWN.

GROWERS HAVE BEEN SUCCESSFUL RAISING THE HYBRID IN FARM PONDS, BUT SCIENTISTS KNOW THAT CURRENT FEED RATIONS FOR THE HYBRID ARE NOT IDEAL FOR THE MOST EFFICIENT PRODUCTION.

HYBRID STRIPED BASS PRODUCERS HAVE SEVERAL OPTIONS WHEN THEY EXPLORE THE AVAILABLE FEEDS, BUT THESE FEEDS HAVE NOT BEEN FORMULATED FOR HYBRIDS, SAID BROWN.

RESEARCH AT PURDUE IS EVALUATING ALL THE AVAILABLE HYBRID STRIP BASS DIETS CURRENTLY ON THE MARKET. THERE ARE THREE DIETS LABELED FOR HYBRID STRIPED BASS. SO FAR, THAT RESEARCH SHOWS THAT WEIGHT GAIN IS GOOD TO EXCELLENT IN FISH FED THOSE THREE EXISTING DIETS, BUT WEIGHT GAIN ON ONE OF THE EXPERIMENTAL DIETS WAS AT AN EVEN HIGHER RATE.

IN ADDITION TO RATE OF GAIN, SCIENTISTS ARE STUDYING THE EFFECT OF THE FEED ON THE LIVER OF THE HYBRID STRIPED BASS. "LIVER DEGENERATION IS A SERIOUS PROBLEM IN FISH AS IT IS IN OTHER ANIMALS," SAID BROWN.

DURING THE PURDUE FEED STUDY TRIALS, BROWN AND COLLEAGUE RANDY WHITE OF THE ANIMAL DISEASE DIAGNOSTIC LABORATORY AT PURDUE, FOUND THAT LIVER DEGENERATION WAS PRESENT IN FISH FED ALL THREE PRACTICAL DIETS.

THE STUDY SHOWS THERE IS A TRADE OFF FOR GROWTH AND LIVER DEGENERATION WITH CURRENT FEED PROTEIN AND FAT LEVELS. PHASE 1 HYBRIDS (FISH WHICH ARE 1-5 G IN SIZE) APPEAR TO GROW BETTER WHEN FED RELATIVELY HIGH LEVELS OF PROTEIN (35-40%), WHICH IS SIMILAR TO TROUT. BUT, FAT LEVELS IN THE HYBRIDS ARE EXCESSIVE WHEN FED EXISTING TROUT DIETS AND LIVER DEGENERATION OCCURS.

"HYBRIDS APPEAR TO NEED THE PROTEIN LEVELS TYPICALLY FOUND IN TROUT DIETS, BUT THEY NEED THE FAT LEVELS TYPICALLY FOUND IN CATFISH DIETS, SAID BROWN. GIVEN THESE EARLY RESULTS, HIGH-QUALITY GRAIN PRODUCTS (SUCH AS SOYBEAN MEAL AND CORN) APPEAR TO HAVE POTENTIAL AS INGREDIENTS IN HYBRID DIETS. THESE STUDIES ARE NOT ENOUGH TO DEFINE A DIET FOR THIS IMPORTANT AQUACULTURE FISH, BUT WITH THE CONTINUED HELP - FROM PRODUCERS WHO IDENTIFY PROBLEM AREAS THAT REQUIRE RESEARCH AND CONTINUED INTEREST FROM FEED MANUFACTURERS - DIETARY MODIFICATIONS CAN BE DEVELOPED AND IMPLEMENTED.

UNTIL THE RESEARCH COMMUNITY CONDUCTS THE APPROPRIATE STUDIES AND CAN FIRMLY RECOMMEND PARTICULAR FEED TYPES, PRODUCERS ARE LEFT TO TRIAL AND ERROR. BROWN NOTED THAT SOME GROWERS ARE NETTING ONLY 1 LB. OF GROWTH PER 3 LB. OF FEED. ULTIMATELY, THE FISH - POTENTIALLY ONE OF THE MOST FEED EFFICIENT FORMS OF LIVESTOCK - SHOULD BE ABLE TO APPROACH 1 LB. OF GAIN PER 1 LB. OF FEED.

CAGE CULTURE

AS FISH FARMING EXPANDS, MUCH OF THAT EXPANSION MAY BE DUE TO THE CAGE CULTURE'S SUCCESS. CAGE CULTURE IS FREQUENTLY THE MOST RAPID AND ECONOMICAL MEANS OF ENTERING INTO THE AQUACULTURE PRACTICE, SAID JOHN R. MORRISON, WHO WORKS WITH THE UNIVERSITY OF SOUTH CAROLINA INTERNATIONAL AQUACULTURE AND MARINE PROGRAMS.

IN MANY AREAS, FARM PONDS ARE READILY AVAILABLE AND ARE OFTEN UNDER-UTILIZED FOR FISH PRODUCTION.

"THE RELATIVE INVESTMENT REQUIRED TO BEGIN CAGE PRODUCTION IS A SMALL FRACTION OF THE COSTS ENTAILED BY THE CREATION OF SPECIALIZED PONDS SYSTEMS, WHICH MAY COST \$2,000 PER SURFACE ACRE FOR CONSTRUCTION ALONE," SAID MORRISON.

AS CAGE CULTURE GROWS, FEEDING FISH WILL UNDOUBTEDLY CHANGE. FEEDING IN A CAGE CULTURE SYSTEM IS MUCH DIFFERENT THAN FEEDING IN AN OPEN POND.

IN POND CULTURE, GETTING FEED TO ALL THE FISH AND REDUCING WASTAGE CAN BE DIFFICULT BECAUSE OF THE RELATIVELY LARGE AREA OF WATER.

ON THE OTHER HAND, THE POND ITSELF CONTRIBUTES SOME NUTRITION FROM NATURALLY OCCURRING POND ORGANISMS, SUCH AS TADPOLES, AQUATIC INSECTS AND MICROSCOPIC ORGANISMS.

FEEDING FISH IN CAGES IS SIMPLER THAN FEEDING FISH IN PONDS BECAUSE OF THE RELATIVE EASE OF REACHING MANY FISH IN A SMALL AREA. BUT, BROWN NOTED, THE DIET HAS TO BE NUTRITIONALLY COMPLETE BECAUSE FEW POND ORGANISMS WILL FIND THEIR WAY INTO THE CAGE.

AS MORE GROWERS EXPERIMENT WITH CAGES, THEY WILL FIND WHICH SPECIES ARE BEST SUITED FOR CAGE CULTURE. BECAUSE EACH SPECIES MAY CALL FOR A DIFFERENT FEED RATION, THOSE MOST SUITED TO CAGE CULTURE MAY, IN THE FUTURE, INCREASE THE DEMAND FOR CERTAIN TYPES OF FEED RATIOS.

SELECTING THE APPROPRIATE FISH FOR CAGE CULTURE IS DEPENDANT ON A NUMBER OF FACTORS. TWO IMPORTANT CONSIDERATIONS ARE TOLERANCE TO CROWDED CONDITIONS AND FAST GROWTH RATE. SEVERAL SPECIES MAY WORK WELL FOR CAGE CULTURE: BLUEGILL, CATFISH, HYBRID STRIPED BASS, TROUT AND WALLEYE.

WHEN COMMERCIAL CAGE CULTURE OR OTHER SMALL-SCALE COMMERCIAL AQUACULTURE BEGIN TO DEVELOP IN A REGION OF LOW PREVIOUS AQUACULTURE ACTIVITY, THE DEMAND FOR FEED AT DISCOUNTED PRICES WILL DEVELOP. FARMERS IN CERTAIN REGIONS OF THE U.S. ARE FINDING THAT THEY MUST BUY FEED COLLECTIVELY TO GET BULK DISCOUNTS. MORRISON POINTED OUT, THAT FOOD PRICES CAN BE AS HIGH AS \$14 PER 50-LB. BAG FOR 32% PROTEIN FLOATING CATFISH FEED WHEN PURCHASED IN SMALL QUANTITIES. THIS

IS EQUIVALENT TO \$560 PER TON, COMPARED WITH \$300 PER TON OR LESS ON ORDERS OF ONE TON OR MORE, HE SAID.

FISH FARMERS WILL FIND PLENTY OF CHALLENGES, WHICH WILL CALL FOR MORE RESEARCH. YET, ENOUGH RESEARCH HAS BEEN DONE THAT MANY GROWERS ARE SUCCESSFULLY COMPETING AND MEETING MARKET NEEDS. BUT, AS MORE FARMERS ENTER THE FISH MARKET, HIGH-EFFICIENCY RATES WILL HELP COMPETITIVE FARMERS. BECAUSE FEED IS ONE OF THE LARGER COMPONENTS OF FISH PRODUCTION COSTS, GROWERS WILL SEARCH FOR MORE EFFICIENT RATIONS.