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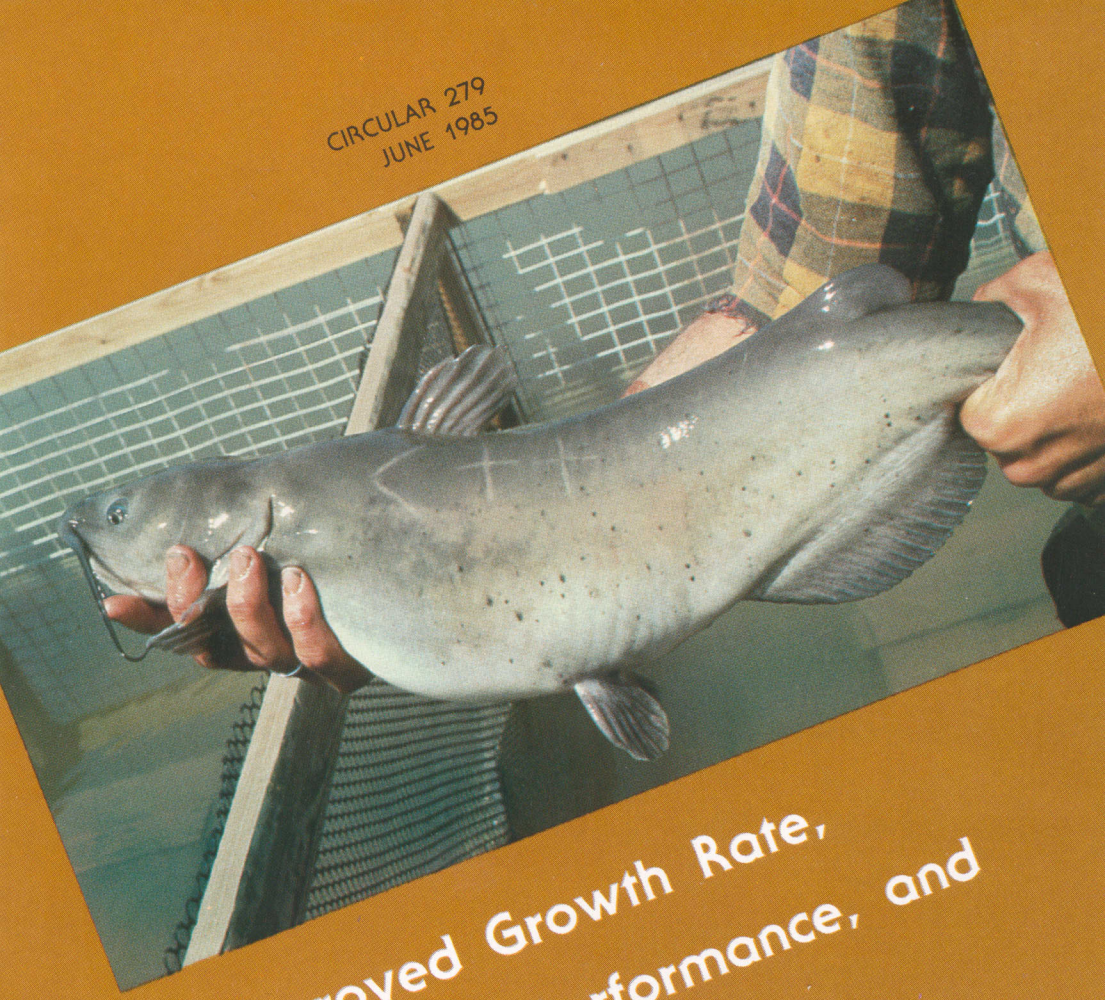

Improved Growth Rate, Reproductive Performance, and Disease Resistance of Crossbred and Selected Catfish from AU-M and AU-K Lines

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INTRODUCTION

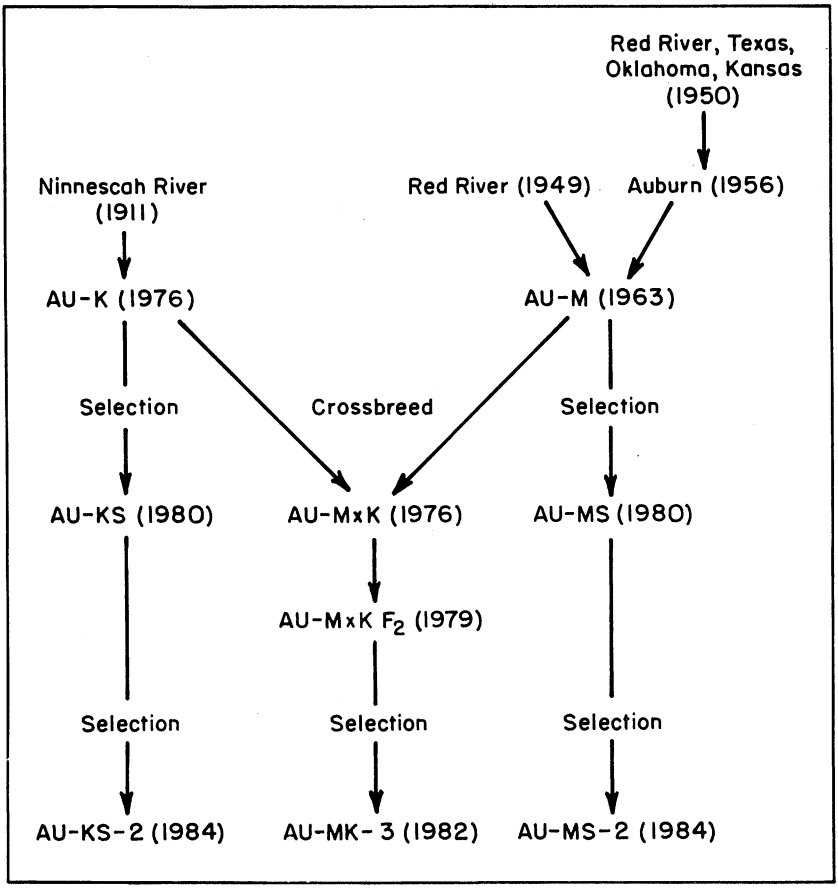
Auburn University has compared several strains of channel catfish, *Ictalurus punctatus*, for culture traits such as growth rate, disease resistance, reproductive performance, seinability, and dressing percentage. These same strains were also utilized in crossbreeding and mass selection programs. AU-K and AU-M were two of the most rapid growing strains tested and when crossed, AU-M females x AU-K males produced a fast-growing crossbred that possessed desirable angling and reproductive traits. The growth rates of AU-M, AU-K, and their crossbreed were further improved through mass selection. Fish developed from these breeding programs, AU-KS-2, AU-MS-2, AU-MK-3, and AU-M x AU-K, offer catfish producers the opportunity to improve the performance of their fish. Pedigrees for these fish are presented in the figure.

ORIGIN AND TRAITS

Ancestors of AU-M were first captured by the Arkansas Fish and Game Commission in 1949 below the Denison Dam, Red River, Oklahoma (*4*). These fish were propagated at Arkansas State Fish Hatcheries and private farms in Arkansas during the 1950's. The Marion Federal Fish Hatchery, Marion, Alabama, obtained some of these fish in the late 1950's. Brood stock from Auburn foundation stock were added in 1963 and 1965. AU-M was transferred to Auburn in 1976.

AU-M exhibits rapid growth, table 1, and improved seinability. Dressing percentage and resistance to *Flexibacter col-*

[1]Assistant Professor and Professor, respectively, of Fisheries and Allied Aquacultures.



Pedigree of improved channel catfish, AU-KS-2, AU-MXK, AU-MK-3, and AU-MS-2.

umnaris are relatively poor, table 1. Albinism is common in this strain and albinism in other stocks of channel catfish is probably due to kinship to this strain.

AU-K is the oldest known domesticated strain of channel catfish. These fish were captured from Ninnescah River, Kansas, in 1911 by the Kansas State Fish Hatchery at Pratt (*4*). This strain was transferred to a private farm in Kansas in 1930 and to Auburn University in 1976.

AU-K is fast growing and relatively disease resistant, table 1. Compared to other strains, AU-K requires one more year to become sexually mature. Spawning rates, greater than 50%, should not be expected until these fish are 4 years old.

TABLE 1. COMPARISON OF MEAN BODY WEIGHT, FEED CONVERSION RATIO (S), DRESSING PERCENTAGE AND PARASITE LOAD FOR CHANNEL CATFISH OF DIFFERENT STRAINS GROWN IN EARTHEN PONDS AT 2,834/ACRE

Strain[1]	Body Weight, (lbs.)	S	Dressing percentage	CPU[2]	Parasite loads		
					Tricho-dina	Scyphidia	Cleidodiscus
Experiment 1							
AU-K	1.53 a	1.26 a	59.3 b	24.3 ab	3	34	5
AU-M	1.36 b	1.26 a	59.3 b	35.4 a	0	89	46
Auburn	1.06 c	1.36 ab	63.3 a	18.5 b	14	556	30
Rio Grande	0.97 d	1.42 b	64.0 a	29.2 ab	9	800	10
Experiment 2							
AU-KS[3]	1.13 a	—	62.4 a	—	—	—	—
AU-MS[3]	1.07 b	—	61.1 a	—	—	—	—
AU-K	1.01 c	—	62.4 a	—	—	—	—
AU-M	0.91 d	—	61.7 a	—	—	—	—

[1]Means followed by different letters are significantly different ($P<0.05$).
[2]Seinability (catch per unit effort).
[3]Produced through one generation of mass selection.

MASS SELECTION

Both AU-M and AU-K have been improved through mass selection (*2*). One generation of mass selection increased body weight 18 percent and 12 percent in AU-M and AU-K, respectively. Realized heritability for AU-M was 0.50 ± 0.13 and for AU-K was 0.33 ± 0.10. The increase in body weight was attributable to increases in both feed consumption and feed conversion efficiency.

The selection for body weight did not affect other traits, such as dressing percentage and seinability. Correlated increases in disease resistance for AU-M and fecundity for AU-K occurred when selected for body weight (*1*).

Both strains have been selected in a second generation for body weight, resulting in the development of AU-MS-2 and AU-KS-2 lines. AU-KS-2 was the fastest growing line in a comparison of stocks available at research institutions in the Southeastern United States, table 2.

CROSSBREEDING

The crossbred progeny from AU-M females and AU-K males, AU-MxK are the fastest growing crossbred catfish evaluated at Auburn University (*3*), table 3. AU-MxK exhibits heterosis for disease resistance, table 3, and is highly vulnerable to angling. AU-MxK is the most catchable (hook and line) genetic group of channel catfish tested at Auburn.

TABLE 2. MEAN BODY WEIGHTS OF CHANNEL CATFISH STRAINS GROWN IN EARTHEN PONDS STOCKED AT 2,834/ACRE

Strain or cross	Body weight (lbs.)
AU-MK-3	1.13
AU-KS-2	1.09
Tifton+	0.89
FFES-1	0.80
Auburn (Texas A&M)[1]	0.75
Mississippi (commercial)	0.68
MSU-F_2	0.66
LSU-F_2	0.65

[1]From Auburn foundation stock obtained in 1971.

TABLE 3. MEAN BODY WEIGHT, FEED CONVERSION RATIO (S), PARASITE LOAD AND REPRODUCTIVE PERFORMANCE OF AU-M, AU-K CHANNEL CATFISH AND THEIR CROSSBREED AU-MxK

Measure	AU-MxK	AU-M	AU-K
6-month body weight, lbs	0.27 a	0.20 b	0.22 b
18-month body weight, lbs	1.64 a	1.36 c	1.53 b
Feed conversion ratio, S	1.22 a	1.26 a	1.26 a
Parasite load			
Trichodina	14	0	3
Scyphidia	22	89	34
Cleidodiscus	10	46	5
Spawning rate (3 years old), pct.	62 a	28 b	4 c
Spawning rate (4 years old), pct.	53 a	54 a	49 a
Number of eggs/lb female (3 years old)	3,530 a	2,320 b	3,152 a
Number of eggs/lb female (4 years old)	3,687 a	3,673 a	3,639 a
Fingerling/lb female (3 years old)	1,101 a	200 b	20 c
Fingerling/lb female (4 years old)	818 a	684 c	798 b

The AU-MxK crossbreed exhibits heterosis for early sexual maturity (*5*), table 3. These fish had high spawning rates compared to their parent strains when 3 years old, but spawning rates were not different when they were 4 years old. In attempts to hybridize channel catfish females with blue catfish males, AU-MxK females have been more receptive to mating with blue catfish than females of other genetic groups of channel catfish.

AU-MK-3

AU-MxK brood stock were mated to produce an F_2 generation (*6*). The F_2 generation was mass selected for body weight and bred to produce the line, AU-MK-3. These fish were compared to others from research institutions throughout the Southeast, and AU-MK-3 and AU-KS-2 were the fastest growing lines evaluated, table 2.

MAINTENANCE OF STOCK QUALITY

The mating of close relatives in channel catfish will cause inbreeding depression or reduction in growth, viability, and reproductive performance. Inbreeding depression can be minimized in select stocks and other stocks by maintaining and spawning at least 50 brood pairs. A few brood replacements should be obtained from each fingerling pond prior to mixing of the fish in holding facilities to ensure a good representation of the population.

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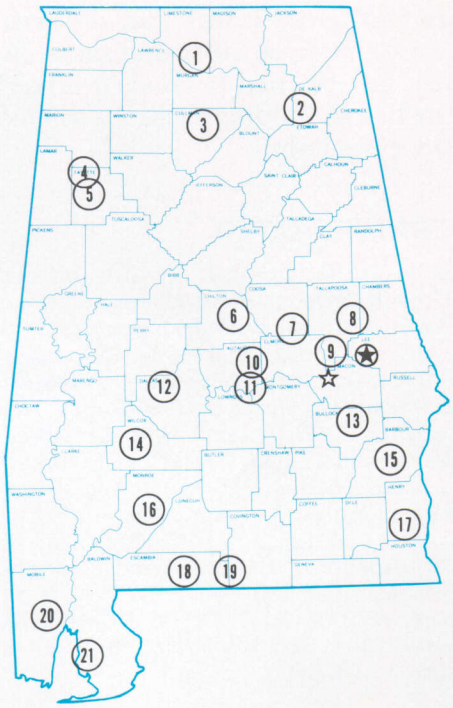

Research Unit Identification

★ Main Agricultural Experiment Station, Auburn.
☆ E. V. Smith Research Center, Shorter.

1. Tennessee Valley Substation, Belle Mina.
2. Sand Mountain Substation, Crossville.
3. North Alabama Horticulture Substation, Cullman.
4. Upper Coastal Plain Substation, Winfield.
5. Forestry Unit, Fayette County.
6. Chilton Area Horticulture Substation, Clanton.
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11. Prattville Experiment Field, Prattville.
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16. Monroeville Experiment Field, Monroeville.
17. Wiregrass Substation, Headland.
18. Brewton Experiment Field, Brewton.
19. Solon Dixon Forestry Education Center, Covington and Escambia counties.
20. Ornamental Horticulture Substation, Spring Hill.
21. Gulf Coast Substation, Fairhope.