

## **Cottonseed Meal: How Much Can Be Used in Catfish Feeds?**

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Catfish producers may have potential for saving up to 15% on feed cost by using cottonseed meal. Mississippi State University research conducted at Delta Western Aquaculture Research Center in 1992 showed that using cottonseed meal could potentially save \$10 to \$30 per ton while maintaining rate of gain.

Cottonseed meal, a local product in the Delta where most catfish are grown, is the second most abundant plant protein source produced in the United States.

The USDA estimated the 1993 cotton crop to be the second largest on record and supplies of cottonseed meal are estimated to increase by 10% over last year.

Its availability and competitive price per unit of protein make it an attractive protein source for use in catfish feeds. Also, it appears to be highly palatable to catfish.

The amount of cottonseed meal that can be used in catfish feeds depends mainly on the levels of free gossypol and available lysine found in the meal.

As free gossypol decreases in so cottonseed meal, so does the available lysine because free gossypol is bound to lysine during processing of cottonseed into meal.

Maximum levels of cottonseed meal recommended for use commercial catfish feeds have generally not exceeded 10 to 15% because of the potential toxicity of free gossypol.

Based on our studies, however, free gossypol toxicity appears to be less a problem than a potential lysine deficiency in catfish feeds containing cottonseed meal.

Although relatively high levels of cottonseed meal can be used in catfish feeds, it is not known how much can be used without a resultant deficiency in available lysine. In 1992, a study was conducted at the Delta Western Aquaculture Research Facility by Mississippi Agricultural and Forestry Experiment Station scientists to evaluate (1) cottonseed meal or cottonseed meal with supplemental lysine as a replacement for soybean meal and (2) a combination of soybean meal and cottonseed meal with or without supplemental lysine as a replacement for animal protein in catfish feeds.

Eight practical-type feeds (Table 1) containing 32% protein were used in this experiment. Each feed was fed to catfish (average initial size: 0.4 lb) stocked into five 0.1 acre ponds at rate of 10,000 fish/acre. The fish in each pond were fed once daily to satiation for 170 days.

Generally, results showed no significant differences in weight gain, feed consumption, feed conversion ratio, percent dress-out, and fillet composition in catfish fed different feeds compared to fish fed the control feed (feed 1).

TABLE 1. Major protein sources and percentages used in experimental feeds.					
Feed Number	Soybean Meal (48%) <sup>1</sup>	Cottonseed meal (41%)	Menhaden fish meal (61%)	Meat and bone / blood meal (65%)	Lysine - HCl
1	42.0	0	4.0	4.0	0
2	52.0	0	0	0	0
3	19.8	40.0	0	0	0
4	19.8	40.0	0	0	0.48
5	16.5	30.0	4.0	4.0	0
6	16.5	30.0	4.0	4.0	0.32
7	0	51.3	4.0	4.0	0
8	0	51.3	4.0	4.0	0.65

<sup>1</sup> percentage protein

A lysine deficiency was observed only in the fish fed feed 7 which contained 51% cottonseed meal and was estimated to provide only 68% of recommended available lysine level. Adding lysine to this feed improved fish growth.

In contrast, adding lysine to catfish feeds containing 30 and 40% cottonseed meal with estimated available lysine levels of 76 and 82% of the recommended requirement level, respectively, did not improve fish performance.

This suggests that (1) the availability of lysine in cottonseed meal may be higher than previously estimated; (2) natural food organisms in the pond may have contributed nutrients including lysine; or (3) feeds were sufficient in lysine but were too high in total protein (32%) for grow-out catfish fed to satiation. The data also indicated that when supplemented with lysine cottonseed meal can be used to replace all of the soybean meal in catfish feeds.

In addition, a combination soybean meal, cottonseed meal and supplemental lysine can be used to replace all of the animal protein in catfish feed without affecting fish performance.

Based on 1992 prices, cost of experimental feeds ranged from \$196 to \$227 per ton and resulted in gains ranging in cost from \$0.166 to \$0.194 per lb. Feed 3 (all-plant protein, 40% cottonseed meal) was the least expensive feed based on either cost per ton (\$196) or on cost per lb of gain (\$0.166).

However, cost per lb of gain was only slightly higher (\$0.168) for feed 6, which contained a mixture of animal and plant proteins (30% cottonseed meal) plus lysine. These results indicate considerable savings are possible using cottonseed meal. However, actual savings will vary year to year in relation to agricultural commodity prices.

Results from this study showed that up to 50% cottonseed meal (when supplemented with lysine) could be used in catfish feeds without adverse effect on growth. It appears that up to 40% cottonseed meal could be used without lysine supplementation.

However, presently it is not recommended that more than 30% cottonseed meal be used in catfish feeds until additional data are available on the possible effects of gossypol on reproduction in catfish as has been shown in humans and other animals.

A Mississippi State University study is in progress at the Delta Western Research Facility to determine maximum safe levels of cottonseed meal in brood fish feeds and should be completed in 1994.

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