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| Project Number:  | 1730-352-0507 |
| Project Title:  | Genetic improvement of soymeal diet (SMD) utilization in largemouth bass (LMB) phase one: Evaluating genetic variation of different strains and families and identifying the best strains with the genetic trait of effective utilization of SMD. |
| Organization:  | The Ohio State University |
| Principal Investigator Name: | Hanping Wang |
| Project Status - What key activities were undertaken and what were the key accomplishments during the life of this project? Please use this field to clearly and concisely report on project progress. The information included should reflect quantifiable results (expand upon the KPIs) that can be used to evaluate and measure project success. Technical reports, no longer than 4 pages, may be included in this section.  |
| Four strains of largemouth bass from different states were collected to evaluate strain and family growth response to SMD and fishmeal-based diet (FMD). A study on evaluation of growth response of Northern and Southern subspecies to SMD and FMD was completed. For this study, four diets were formulated with varying levels of dietary soybean meal 0 (control), 12, 25, and 40%, respectively. The feeding trial with 4 replicates lasted for 12 weeks. Results showed: 1) Northern subspecies grew significantly faster (*P*<0.001) and gained significantly higher (*P*<0.001) body weight than Southern subspecies across the four levels of soybean meal diets (see Figs. below).  2) Northern subspecies utilized SMD significantly better than Southern subspecies (see Fig. below). 3) Based on the feed efficiency, 12% dietary soybean meal inclusion is optimal for Southern largemouth bass. 25% soybean meal can be used in diet for Northern largemouth bass. 4) The growth of largemouth bass decreased with increasing dietary soybean meal level and no significant differences were observed among the treatments for two subspecies. Diet with 40% soybean meal inclusion is acceptable for juveniles.An extra experiment is underway beyond this project. For the experiment, we have produced LMB fingerling to evaluate genetic variation of more strains and families. Since Northern subspecies utilize SMD significantly better than Southern subspecies, the experiment on evaluating genetic variation of different strains and identifying the best strains with the genetic trait of effective utilization of SMD within Northern subspecies is necessary. |
| Did this project meet the intended Key Performance Indicators (KPIs)? List each KPI and describe progress made (or not made) toward addressing it, including metrics where appropriate.  |
| Yes.Objective 1 – *Genetic improvement of SMD utilization rate of Largemouth bass (LMB) I: Evaluating genetic variation of different strains and families and identifying the best strains with the genetic trait of effective utilization of SMD.*A study on evaluation of growth response of Northern and Southern subspecies to SMD and fishmeal-based diet (FMD) was completed. Four diets were formulated with varying levels of dietary soybean meal 0 (control), 12, 25, and 40%, respectively. The feeding trial with 4 replicates lasted for 12 weeks. Results showed that 1) Northern subspecies grew significantly faster (*P*<0.001) and gained significantly higher (*P*<0.001) body weight than Southern subspecies across the four levels of soybean meal diets; 2) Northern subspecies utilized SMD significantly better than Southern subspecies; 3) Based on the feed efficiency, 12% dietary soybean meal inclusion is optimal for Southern largemouth bass. 25% soybean meal can be used in diet for Northern largemouth bass; 4) The growth of largemouth bass decreased with increasing dietary soybean meal level and no significant differences were observed among the treatments for two subspecies. Diet with 40% soybean meal inclusion is acceptable for juveniles. An extra experiment is underway. For this we have produced LMB fingerling to evaluate genetic variation of more strains and families. Since Northern subspecies utilize SMD significantly better than Southern subspecies, the experiment on evaluating genetic variation of different strains identifying the best strains with the genetic trait of effective utilization of SMD within Northern subspecies is necessary.Objective 2-*Develop and provide educational and promotional materials geared toward promoting Midwest aquaculture products, and disseminate results from objective 1 to Midwest and China.* Two manuscripts have been completed from above results and are being submitted and distributed.  |
| Expected Outputs/Deliverables - List each deliverable identified in the project, indicate whether or not it was supplied and if not supplied, please provide an explanation as to why. |
| *Develop and provide educational and promotional materials geared toward promoting Midwest aquaculture products, and disseminate results from objective 1 to Midwest and China*. Two manuscripts have been completed from above results and are being submitted. Based on the experiment one and current experiment 2, educational and promotional materials geared toward promoting the Midwest aquaculture products are in preparation and will be distributed once the 2nd experiment has been completed. |
| Describe any unforeseen events or circumstances that may have affected project timeline, costs, or deliverables (if applicable.) |
| One year is too short for completing two experiments with this project and producing or obtaining different strains and families took a longer time than expected.  |
| What, if any, follow-up steps are required to capture benefits for all US soybean farmers?Describe in a few sentences how the results of this project will be or should be used. |
| The results from current study shows that sufficient genetic variation exists for growth and feed efficiency for largemouth bass fed with both FMD and SMD, suggesting that genetic improvement is possible for the trait of feed efficiency in this species. There is a need of genetic selection for improvement of SMD utilization. Therefore, the follow-up steps will be conducting selective breeding and producing superior broodstock of LMB with the traits of better SMD feed efficiency for global LMB aquaculture industry, and delivering superior LMB strains with higher SMD utilization rate to fish farmers in the Midwest, US and other major aquaculture countries. Exploring utilization of soybean meal-based diets for LMB will greatly promote and increase use of soybean in many countries, especially in the USA and China, which currently owns 70% global aquaculture production and imports a lot of soybean from the Midwest and USA.  |
| **List any relevant performance metrics not captured in KPI’s.** |
| Two publications are in revision.  |