李明智,张光发,邓长辉,李秀辰,史明礼,杨君德,惠盼盼,马国振,吴嵩.虾夷扇贝浮筏养殖作业改造与试验[J].农业工程学报,2014,30(11):195-204

虾夷扇贝浮筏养殖作业改造与试验

Reconstruction and experiment on raft culture working for Patinopecten yessoensis

投稿时间： 2013-10-31 最后修改时间： 2014-03-05

中文关键词: 水产养殖 改造 机械化 作业模式 虾夷扇贝

英文关键词:aquaculture reconstruction mechanization operating mode Patinopecten yessoensis

基金项目:十二五国家科技支撑项目（2013BAD23B01）；辽宁省高等学校优秀人才支持计划项目（LR2012024）；獐子岛集团股份有限公司委托横向课题

作者	单位
李明智	1. 大连海洋大学航海与船舶工程学院，大连 116023
张光发	1. 大连海洋大学航海与船舶工程学院，大连 116023
邓长辉	2. 大连海洋大学辽宁省渔业装备工程技术研究中心，大连 116023
李秀辰	2. 大连海洋大学辽宁省渔业装备工程技术研究中心，大连 116023
史明礼	3. 獐子岛集团股份有限公司，大连 116001
杨君德	3. 獐子岛集团股份有限公司，大连 116001
惠盼盼	1. 大连海洋大学航海与船舶工程学院，大连 116023
马国振	1. 大连海洋大学航海与船舶工程学院，大连 116023
吴嵩	1. 大连海洋大学航海与船舶工程学院，大连 116023

中文摘要:

该文针对目前虾夷扇贝（Patinopecten yessoensis）浮筏养殖作业用工量大、劳动强度高、工作效率低、耗能高以及尾气和噪音污染严重等问题，通过对獐子岛虾夷扇贝浮筏养殖作业工作模式与回收养殖吊笼方式的调研，提出了虾夷扇贝浮筏养殖作业的改进方案，并通过海上生产对比试验，得出以下结论：第1阶段以8 m长浮筏养殖作业船为母船，安装了电动拔梗装置、拔笼装置、抖笼装置、筛苗装置以及齿形滑轮滑梗装置，改变单纯依靠人力工作的作业模式为机械化作业模式，不仅用工人数及劳动强度大幅降低，并且拔笼量较原浮筏养殖作业平均每天单船提高了56.01%，耗能费用降低了13.95%；第2阶段在保留第1阶段机械化设备的基础上，对养殖作业船只的作业模式进行了改造，用船长12 m、船宽3.3 m、型深0.7 m，尾挂机型号洋马/CY1115，最大功率 16.2 kW的作业船代替了原来船长8 m、船宽2.4 m、型深0.5 m，尾挂机型号ZS195，最大功率9.7kW的作业船，并省去了辅助运输船舶，将养殖作业和辅助运输合并为一条船。试验结果显示，拔笼数量较第1阶段改造的浮筏养殖作业模式平均每天单船提高了31.69%，较原浮筏养殖作业模式平均每天单船拔笼量提高了1.05倍。第2阶段改造的浮筏养殖作业船的装载和运输能力满足实际工作需求，平均每天单船耗能费用与第1阶段改造的浮筏养殖作业模式无显著性差异，较原浮筏养殖作业模式降低了14.12%。同时第2阶段改造的浮筏养殖作业模式较原浮筏养殖作业模式其单船年节省费用1.08万元。由此说明改造后的浮筏养殖作业装备及作业方式具有节能、高效等特点，推广应用前景广阔。

英文摘要:

Abstract: By analyzing and investigating the condition of raft culture working for Patinopecten yessoensis and the harvest mode of artificial raft suspended culture in Dalian Zhangzidao, a new type of high efficiency and energy-saving raft culture working mode and devices for Patinopecten yessoensis were upgraded reconstruction. In order to prove that working mode and device structure are reasonable, comparative tests were executed in the sea area of raft suspended culture in Dalian Zhangzidao.The test was divided into two stages, with test sites in Da Hao island, Da Lian island, Xiao Hao island, and Zhang Zi island. For the phase I test, four trial sites were respectively equipped with three original floating raft culture boats, three floating raft culture boats of first stage reconstruction, and two material transport boats (the length, width and depth of the original floating raft culture boats and first stage reconstruction floating raft culture boats are 8 m, 2.4 m and 0.5 m respectively; the loading capacity is limited in order to meet work requirements with one material transport boat respectively equipped with three floating raft culture boats). Tests were based on actual production situations, and lasted 44 d, working 8 h per day. From November 2nd, to November 23rd, 2011 is the scallop harvest working test. From July 30th, to August 20th, 2012 is the scallop grading working test. For the phase II test, four trial sites were respectively equipped with three floating raft culture boats of second stage reconstruction, three floating raft culture boats of first stage reconstruction, and one material transport boat (the length, width, and depth of the floating raft culture boats of second stage reconstruction are 12 m, 3.3 m, and 0.7 m respectively; the loading capacity meet work requirements, so floating raft culture boats of second stage reconstruction didn't need a material transport boat). The test lasted 44 d, working 8 h per day. From November 1st to November 22nd, 2012 is the scallop harvest working test. From August 1st to August 22nd, 2013 is the scallop grading working test. At the end of testing per day, the amounts of pulling cage and consumption costs of energy were calculated.The results show that the upgraded reconstruction raft culture working boats on the first stage, which consisted of the installed pull stalk rope device, pull cage device, shake cage device, screen device, and toothed pulley slide stalk rope device, relying solely on human work operation mode was changed to mechanical work mode, and the amounts of pulling cage were increased by 56.01% of single-ship per day. Because the installed electric equipments and the rate of the starting diesel engine were declined, energy consumption costs were reduced by 13.95%. The second stage reconstruction raft culture working boats were based on retaining electric equipments and the length, width, and depth were increased from 8 m to 12 m, from 2.4 m to 3.3 m, and from 0.5 m to 0.7 m respectively. The amount of pulling cages were respectively increased by 31.69% and 105% than floating raft culture boats of first stage reconstruction and the original floating raft culture boats. Energy consumption costs of the second reconstruction raft culture working boats are an insignificant difference with the first reconstruction raft culture working boats and reduced by 14.12% of the original floating raft culture boats. The second stage reconstruction raft culture working mode saved 10.8 thousand yuan per year more than the original floating raft culture working mode. In conclusion, the reconstruction raft culture

working boat improves working efficiency, and reduces energy consumption. It has a good prospect in application.