STUNTED GROWTH IN NILE TILAPIA (*Oreochromis niloticus*) AND ITS IMPLICATION ON THE PROFITABILITY AND PRODUCTIVITY OF SELECTED EARTHEN POND FARMS IN KAMULI DISTRICT

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DECLARATION

I NAMBI CALORINE, declare that this research thesis titled "Stunted growth in Nile tilapia (*Oreochromis niloticus*) and its implication on the profitability and productivity of selected earthen pond farms in Kamuli district" has been through my own efforts and never has it been submitted to Busitema University or any other institution of higher learning for the award of a degree or any other qualification.

Signature:  Date: 03/05/2022

APPROVAL

This is to certify that this research report has been submitted with my approval.

SUPERVISOR'S NAME: RWEZAWULA PHILIP

Date……

Signature……03/05/2022……

DEDICATION

I dedicate this report to my lovely parents; Mr. Kakungulu Nelson and his wife Mrs. Kakungulu Beatrice, my daughter Namuwaya Macklin, my late brother Waibi Jonathan, my sisters and friends for the love, encouragement and support-morally and financially. You are greatly honored. May God bless you abundantly.

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ACRONYMS

FAO:	Food and Agriculture Organization
NaFIRRI:	National Fisheries Resources Research Institute
MAAIF	Ministry of Agriculture Animal Industry and Fisheries
GDP:	Gross Domestic Product
DO:	Dissolved Oxygen
BOD:	Biological Oxygen Demand.
SPSS:	Statistical Package for Social Sciences.
FAO:	Food and Agriculture Organization.
NEPAD:	New Partnership for Africa's Development.
SPADA:	Special Program for Aquaculture Development in Africa.
KDAPS:	Kamuli District Aquaculture Production Statistics.
CAGR:	Compound Annual Growth Rate.
SMEs:	Small and Medium scale Enterprises.
B C:	Before Christ
DiFR:	Directorate of Fisheries Resources
GIFT:	Genetic Improvement in Farmed Tilapia
PH:	Hydrogen potential
CP:	Crude protein

ABSTRACT

Stunted growth has been reported by many Nile tilapia earthen pond farmers as a major problem that's hindering their success. Generally, as a result of rampant stunted growth, very low yields from production of very small low-value fish of different generations, which result into very little revenue obtained from such farms has been reported to demoralize farmers. The aim of the study was to identify and evaluate the causes of stunted growth in earthen pond farmed Nile tilapia (*Oreochromis niloticus*) and its implication on the profitability and productivity of selected farms.The study established that stunted growth in earthen pond Nile tilapia (*Oreochromis niloticus*)in the selected fish farms in Kamuli district was mainly caused by poor feeding (inadequate feeding), over stocking, poor water quality management, poor quality seed/fingerlings, inadequate technical knowledge and poor pond fertilization techniques. Farms that were more affected by stunted growth had poor yields and generated less income as compared to their counterparts that had some knowledge on how to counteract it. Training on feeding, and other good pond husbandry practices such as predator control, water quality management, sampling and grading, were recommended to create awareness and preparation of farmers to mitigate stunted growth and its effects. The government should also establish fish hatcheries in the district to provide good quality fingerlings to farmers, a feed producing plant to avail good quality feeds, and also employ enough fisheries extension workers, to equip farmers with relevant knowledge on good fish farm management practices.

CHAPTER ONE

INTRODUCTION

1.0Introduction

1.1Background to the study

Aquaculture involves the cultivation of both animals and plants in aquatic environments (marine, fresh or brackish) under controlled environmental conditions in production systems such as ponds, tanks, cages, and raceways (Pillay, 1990). Commercial fish farming started in China in the 12thCentury B.C, and it has extended throughout the world (FAO, 2009). With a contribution of about 16% of the total animal protein supplies, aquaculture is presently the most productive industry in the agriculture economy (Wang, 2009). According to FAO, (2020), global fish production was estimated to have reached about 179 million in2018 with an estimated value of USD 401 billion. It accounted for 82 million, approximately 46% of the total production, valued at USD 250 billion, and contributing 52% of the produce for human consumption (FAO, 2020). As opposed to the declining aquaculture production in Europe and Oceania, production in the continents of Africa and Americas has increased although it is still below the dominant Asian production that accounts for over 89% of the global production(Halwart,2020).The African contribution to world aquaculture production is still insignificant (~2.7%) (Halwart,2020) albeit significantly increasing with large-scale investments in Egypt, Nigeria, Uganda and Ghana (Cai, et al.,2017; FAO 2018).According to Halwart,(2020), the region produces around 1.74 million of aquaculture produce, with Egypt (1.1 million), Nigeria (313,000) and Uganda (111,000) as the top three producing countries in Africa. The African production is dominated by Nile tilapia (43.6%), African catfish (11.9%) and common carp (10.15%)(Sserwambala, 2018).The region recorded a 20-fold production increase from 110,200 to 2,196,000 from 1995 to 2018 with a compound annual growth rate (CAGR) of 15.55% (FAO 2016; Halwart,2020). The growth of aquaculture production in the area was due to the advent and intensification of private sector controlled small and medium scale enterprises (SMEs)(Satia,2011). Furthermore, the development of big commercial enterprises mostly stimulated by the combination of burgeoning public support, expertise, foreign direct investment, interest in aquaculture, the global awareness raised through the New Partnership for Africa's Development (NEPAD), Fish for All Summit of 2005, and the

implementation of the FAO Special Program for Aquaculture Development in Africa (SPADA) contributed to aquaculture growth (FAO 2020b).

In Uganda, aquaculture started in 1941 with the introduction of carp into the country by the colonial authorities (MAAIF,2012). Production grew from 15,000 to 118,000 from 2005 to 2015 due to interventions of government and developmental partners such as FAO (FAO, 2020). African catfish (*Clariasgariepinus*) and Nile tilapia (*Oreochromis niloticus*) are the two predominantly cultured fish species in Uganda, with production mainly made up of catfish (60%) and Nile tilapia (40%) (FAO,2020). Nile tilapia is widely cultured among the Ugandan fish farmers due to its prolificacy and tasty appeal (Cai et al.,2017). African Catfish production has been growing and notably common among farmers in the Eastern region as a result of perfection in the breeding technology among hatchery operators (Mwanja,2007).

Although Kamuli district produces mainly Nile tilapia (*Oreochromis niloticus*), there are also other species being farmed (KDAPS, 2020). Earthen ponds dominate the aquaculture production and these total to about 200 in number in the whole district (KDAPS,2020).Theproduction in the district is estimated at 6,516 kilograms per year, valued at 33,770,000 shillings (KDAPS,2021). Fish farmers producing Nile tilapia in earthen ponds in Kamuli experience a number of challenges which include; lack of quality fish seeds, lack of quality fish feeds, inadequate technical staff, lackof organized markets predators, floods, drought, insecurity/theft of fish and stunted growth(Ssebisubi, 2011 &Sserwambala, 2018). This study assessed and analyzed the causes of stunted growth and its implication on Nile tilapia earthen pond farm profitability and productivity. Information generated from this study will help in guiding farmers on how to minimize stunted growth and associated low yields and overall poor farm profitability.

1.2 Statement of the problem and justification of the study

Stunted growth is a major bottle to the rearing of earthen pond Nile tilapia (*Oreochromis niloticus*) in Kamuli district (Lovshin et al., 1990). At harvest, 28% to 70% of the total biomass consists of small stunted low-value fish (Bardach et al., 1972; Ruwet et al., 1976). This has resulted in the desertion of the fish farms by discouraged farmers because of the low output from the harvests, and poor productivity of the farms (Huisman, 1986). Therefore, this study identified and evaluated the causes of stunted growth in earthen pond Nile tilapia andassessed its implication on the profitability and productivity of the farms. This will help to guide farmers on how to counteract

the causes of stunted growthto optimize their Nile tilapia earthen pond production system productivity and profitability.

1.3.0 Objectives of the study

1.3.1 Main objective

To identify and evaluate the causes of stunted growth in earthen pond farmed Nile tilapia (*Oreochromis niloticus*) and its implication on profitability and productivity of selected Nile tilapia earthen pond farms in Kamuli district.

1.3.2Specific objectives

1. To identify and analyze the causes of stunted growth of Nile tilapia from selected earthen pond farms.
2. To evaluate the implication of stunted growth on the profitability and productivity of Nile tilapia earthen pond farms.
3. To identify ways of mitigating the causes of stunted growth to optimize the growth performance of Nile tilapia in earthen fish ponds.

1.4 Research questions

1. What are the local causes of stunted growth in Nile tilapia raised under earthen pond culture system?
2. What is the implication of stunted growth on profitability and productivity of the fish farms?
3. How can stunted growth in earthen pond farmed Nile tilapia be mitigated?

1.5. CONCEPTUAL FRAMEWORK

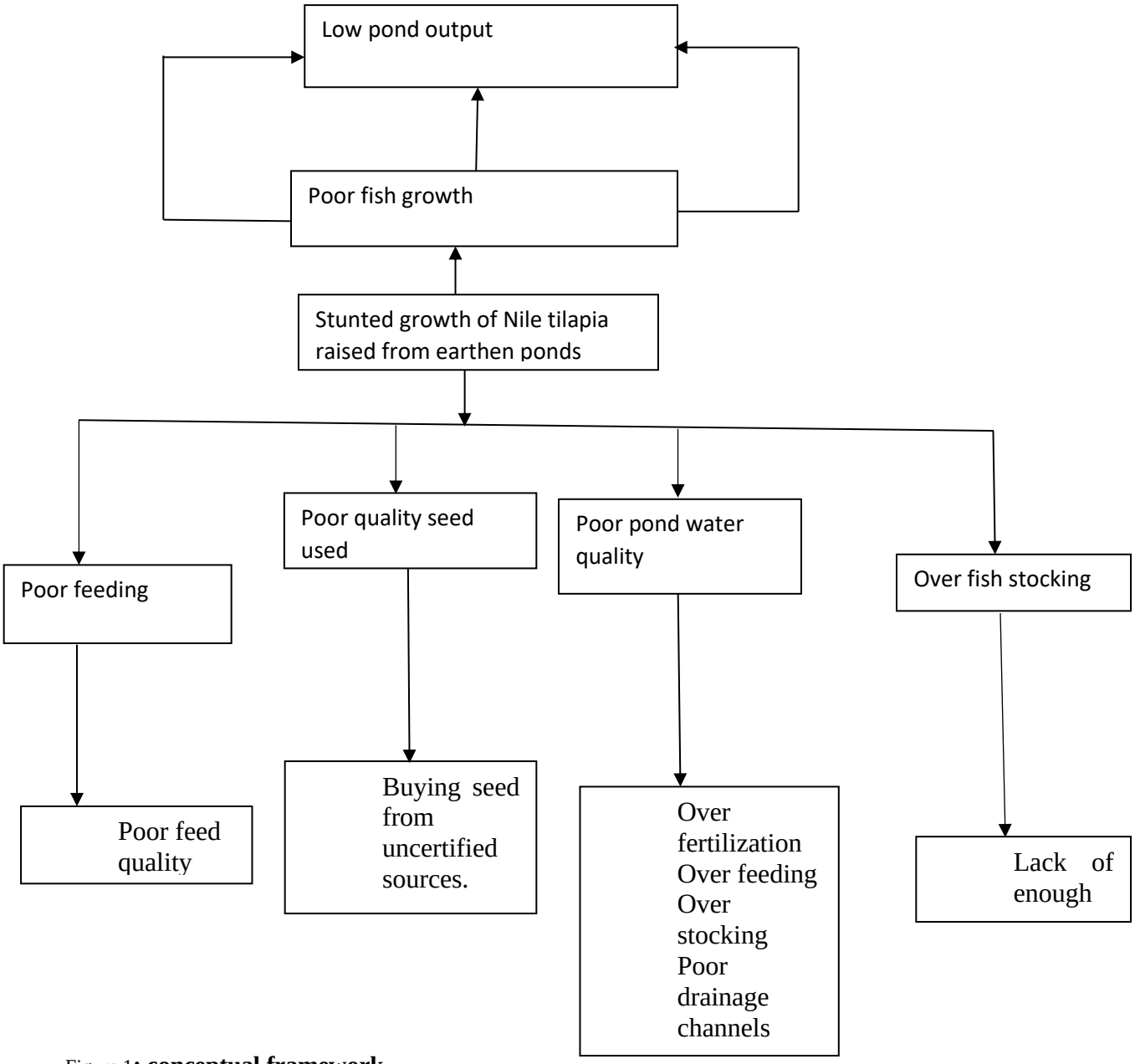

Figure 1**: conceptual framework**

1.6 Originality and contribution to new knowledge

The proposed study is original in terms of the content and geographical scope. Many studies conducted have focused majorly on the causes of stunted growth of Nile tilapia raised under pond culture system in other parts of the country, but not specifically in Kamuli district, yet it is a very serious problem facing fish farmers raising Nile tilapia in earthen ponds. More specifically, this

study is novel in sense that it seeks to identify and evaluate the causes of stunted growth Nile tilapia raised in earthen ponds, and the implication it has on profitability and productivity. To the best of my knowledge, no study has addressed this in the context of Kamuli, Eastern Uganda.

1.7 Significance of the study

The study focused on identification and analysis of the causes of stunted growth in the earthen pond farmed Nile tilapia (*Oreochromis niloticus*), as well as assessing the implication stunted growth hason the profitability and productivity onselected fish farms in Kamuli district. The study will help fish farmers in Kamuli district to increase Nile tilapia production from pond culture systems. Farmers' livelihoods will also be boosted, fish consumption and associated health benefits enhanced, thus, reducing malnutrition incidences especially among vulnerable groups.

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