Nurturing Green Aquaculture in Myanmar (NGA-Myanmar)

DECISION TO PAY ASSESSMENT

Solar Pump & Feed Making Machine

Dec 2022

DISCLAIMER

This publication was produced with the assistance of the European Union. The contents of this publication are the sole responsibility of the author and can in no way be taken to reflect the views of the European Union.

CONTENTS

01

INTRO

NGA-Myanmar's Strategic Environment Assessment (SEA) and Baseline Assessment indicated that aquaculture operations in the programme's target townships have negative impacts to the environment, especially to its surrounding aquatic resources. One of the key drivers for the environmental impacts of the aquaculture sector comes from pollutions that come from inputs use --especially feeds. These assessments also highlighted the importance to address the issues come from the extensive use of water pump in the aquaculture sector.

FARM OPERATIONAL COSTS WERE FOR FEEDS.

Feed, as the key input, as well as feeding practices effect the productivity of aquaculture ponds as they provide main nutrient input for fish.

However, improper feed and feeding practices, have also been responsible for the released of solids, and wasted nutrients such as phosphorus and nitrogen to the nature. When feed is not consumed, the uneaten materials settle onto sediment that will result in flux of ammonia and phosphates, that are responsible for structure change of benthic population in water that trigger algae blooms.

3.6

AVERAGE FEED CONVERSION RATION (FCR).

A relatively high FCR, indicates inefficient feeding methods and feed characteristics used in the programme's target areas.

Feed was also identified among the main contributors of carbon footprints in aquaculture production, especially by looking at emissions from the production and transportation of "linear" feed ingredients

Therefore, NGA-Myanmar's interventions focus on improving practices around feed and feeding. One technology identified as appropriate for the programme's context is the **improved feed making machine**. Through this technology, locally available ingredients such as crop and fishery byproducts and residues are processed into fish feed – **reducing waste**. As the produced feed are pelleted, it will be much easier for fish to consume and be consumed more efficiently – **reducing pollutions**.

FARMS USE DIESEL GENERATOR-POWERED WATER PUMP.

Unfortunately, the generator produces harmful environmental pollutants, incl. nitrogen oxide, currently one of the most important ozone-depleting emission.

Oil spillage from diesel generator for pump has also been a common problem. While costly, it exhausts more than 40 toxic air contaminants, including many known or suspected cancer-causing substances, such as benzene, arsenic, and formaldehyde. The use of fossil fuels certainly contributes to carbon emissions.

NGA-Myanmar identifies **solar-powered pump** as a technology that will tackle the issue. Solar water pumps reduce dependence on electricity or diesel. Once installed, there is no recurrence cost of electricity or fuel. Compared to conventional water pumps, solar water pumps require very little maintenance. Particularly compared with diesel pumping, solar is not only **more energy efficient**, but with a lifespan of over 20 years, the **financial benefits vastly outweigh the costs**.

While solar pump and small-scale feed making machine techs exist, however adoption has been very low. This assessment was done to understand the needs and to identify factors that can help aquaculture farmers and MSMEs to make informed decisions to adopt these greener technologies.

This assessment aims at providing insights and guidance for NGA-Myanmar team and partnered private sector actors on how to develop offerings of the promoted green technologies.

02

METHOLOGY & LIMITATIONS

A survey was done to 204 registered champion entrepreneurs of NGA-Myanmar. These champions were selected by the programme to participate in demonstration activities across the 4 programme's target townships.

METHODOLOGY

Survey was done through phone survey by several trained enumerators hired from Mercy Corps' existing pool of enumerators. Pre survey training was done by NGA-Myanmar's MEL team, prior to data collection. Daily supervision during the phone interviews was provided by relevant NGA-Myanmar team members. Data was tabulated and analyzed on Microsoft Excel by the MEL team.

LIMITATIONS

Phone survey was selected given the unfavorable security context. Information collected was based on respondents recall and self-reported answers. Ideally, the respondents would be presented with the discussed technologies (at least being shown its pictures/designs and detailed specifications). But since it is impossible to do so, the description of each technology was explained verbally.

It was initially planned to target all registered champions (295). But not all champions were available to participate (or could be contacted) during the phone survey and therefore it was only done to those available and/or able to be contacted.

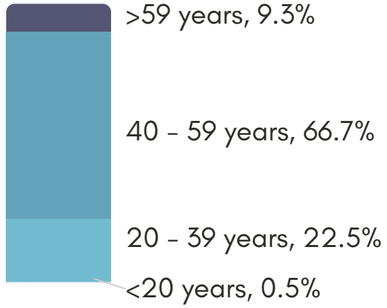
03

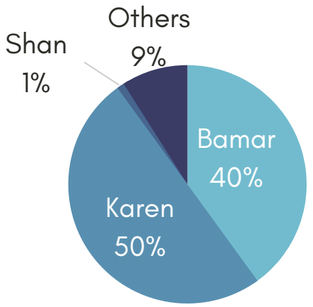
RESPONDENTS PROFILE

DEMOGRAPHIC INFO

The greater part of the respondents were **men**.

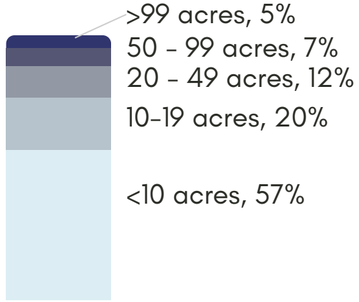
Majority of them aged between **40 to 59 years**





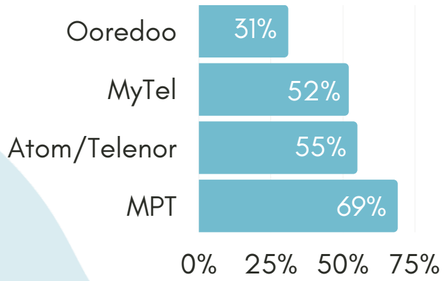
In terms of ethnicity, **Karen** and **Bamar** people accounted for a significant percentage of all respondents

Most of them were **micro aquaculture operators** with pond size of less than 10 acres



RESPONDENTS HAVE INTERNET ACCESS (MOBILE DATA)

Located within the proximity to Yangon, NGA-Myanmar target areas were benefiting from good access to internet, especially through mobile data from **various mobile operators**.

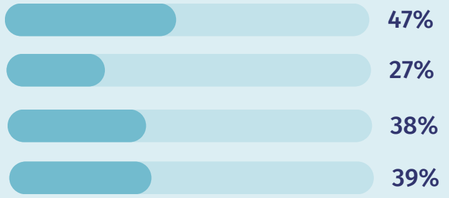


Uses social media. They either used Facebook, Messenger, Viber, or combinations of them.

KEY AQUACULTURE PRACTICES

POND PREPARATION

FEEDING



STOCKING

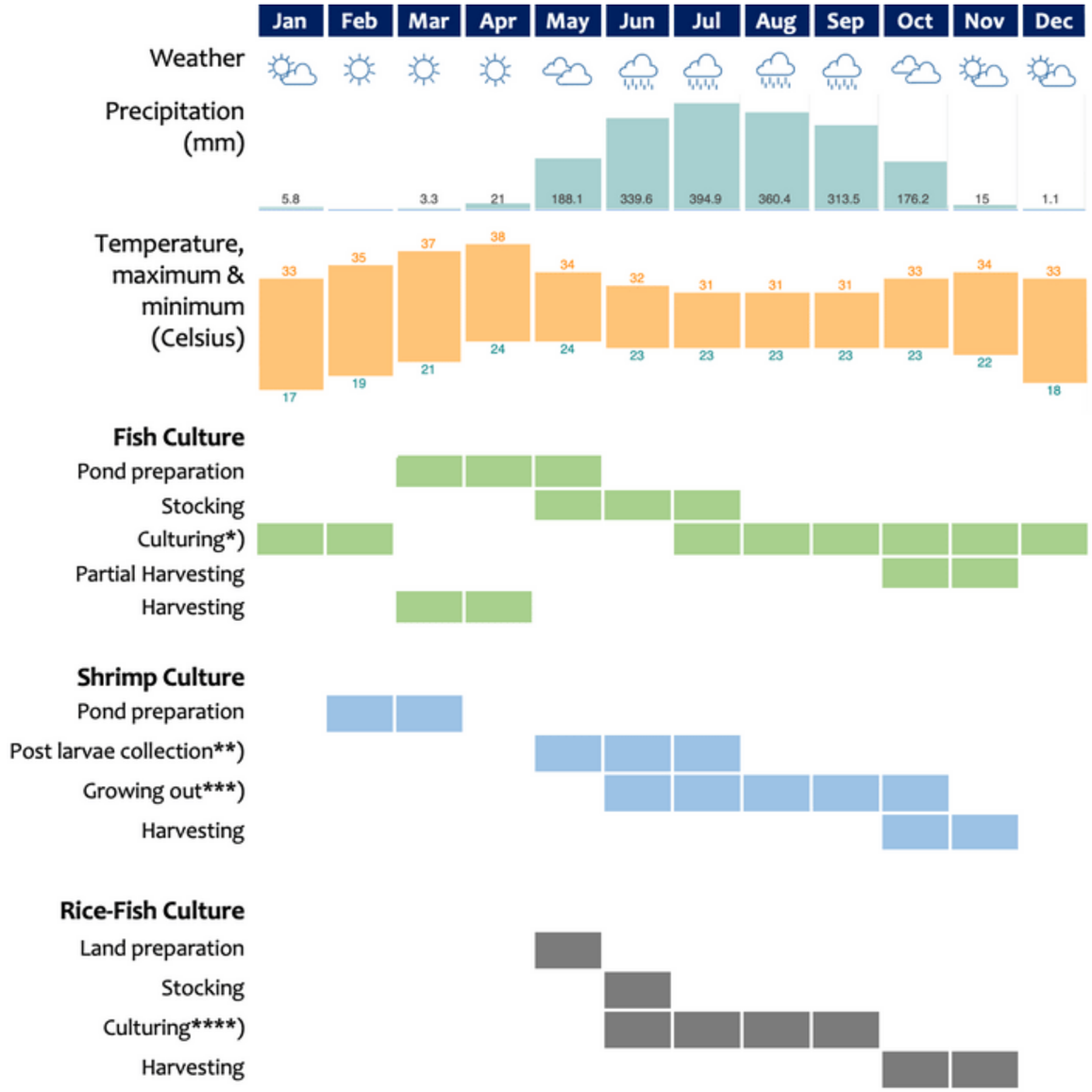
WATER QUALITY

CIRCULAR ECONOMY

Adoption of green practices are not optimum, in many aspects they are relatively low with exceptions of few practices only --mostly around pond preparation.

AQUACULTURE PRODUCTION CALENDAR

Aquaculture production period in NGA-Myanmar target areas varied depending on different factors, mainly variety grown.



*) Period of fish culture depends on species, some are around 6-8 months, but Mrigal can take up to 2 years
**) For P. Monodon, while Vannamei post larvae comes from hatchery
***) P Monodon will take around 5-6 month growing period, while Vannamei only 2-3 months
****) Climbing perch, tilapia, or other common carp are among common fishes

04

THE PROMOTED TECHNOLOGIES

SMALL-SCALE
FISH FEED MAKING MACHINE

KEY FEATURES

Incl. Grinder and Extruder
50-80 kg/hr
Electricity-run generator

BENEFITS

Improve feed formulations → Lower FCR → Higher pond productivity → Less waste!

Promote circularity of ingredients by using agricultural waste & reducing 'linear' materials → Improve adaptability to what's available locally

Floating pellets = Reduce waste + Decrease disease + Convenient observation

FINANCIAL

CAPITAL EXPENDITURES		
Machine Price (complete package)	MMK 3,275,000	(a)
Installation	MMK 50,000	(b)
TOTAL	MMK 3,325,000	(c=a+b)

COSTS (For 100 bags @25 kg)		
Fuel & other costs (Excl. family labour)	MMK 490,000	(d)
Machine Depreciation	MMK 327,500	(e=a*10%
Feed materials	MMK 2,560,713	(f)
	MMK 3,050,713	(g=d+e+f)

BENEFITS (For 100 bags @25 kg)		
~~ 100 bags feed	MMK 4,540,000	(h)
NET BENEFIT	MMK 1,161,788	(i=h-g)
PAYBACK PERIOD (how many bags need to be produced to pay back the CapEx?)	289 bags	(j=i/c*100)

SOLAR PUMPS

KEY FEATURES

9 options

- Submersible or surface pumps
- 800 - 8,000 gallons/hour
- Outlets: 1.5 - 4 inches

BENEFITS

No fuel
Easy to install, maintain & use
Safe
Eco-friendly

FINANCIAL

CAPITAL EXPENDITURES (For 10 acres)		
Machine Price (all inclusive)	MMK 2,980,000	(a)
COSTS (For 1 Year – 10 acres)		
Maintenance cost	MMK 298,000	(b=a*10%)
Machine Depreciation	MMK 298,000	(c=a*10%)
	MMK 596,000	(d=b+c)
BENEFITS (For 1 Year – 10 acres)		
-- Fuel savings	MMK 2,801,766	(e)
NET BENEFIT	MMK 2,205,766	(f=e-d)
PAYBACK PERIOD (how many years are needed to pay back the CapEx?)	**1.35** years	(g=a/f)

05

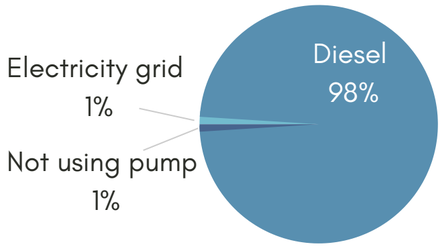
INSIGHTS ON WATER PUMPS

Fish and other aquatic animals live and are totally dependent on the water they live in for all their needs. Therefore, water quality management in aquaculture is vital and must be consistently monitored and controlled for the fish to maintain optimum health, productivity and quality.

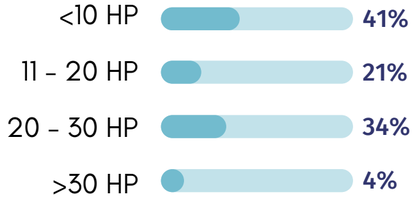
Almost all respondents used diesel-powered generator to power their pumps. Only few of them used energy coming from electricity grid and no one neither used solar pump nor used any pump for their aquaculture.

Natural streams, like rivers, lake, or irrigation canals are the most popular main water source. The rest sourced their water mainly from bore well, either tube well or open well.

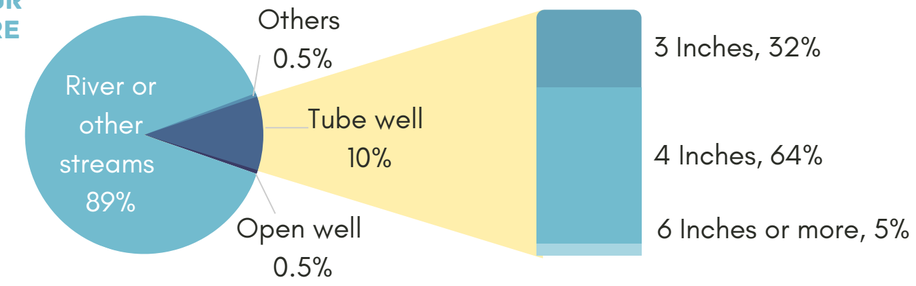
SOURCE OF ENERGY FOR EXISTING PUMP



PUMP CAPACITY



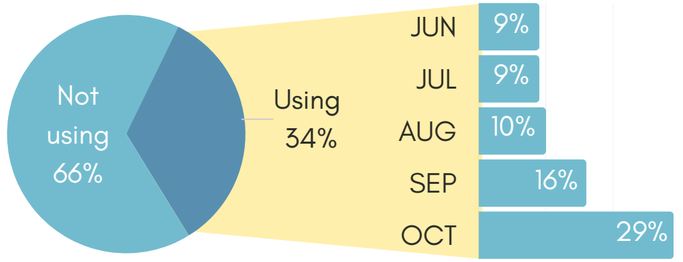
MAIN SOURCE OF WATER FOR AQUACULTURE



TUBE DIAMETER

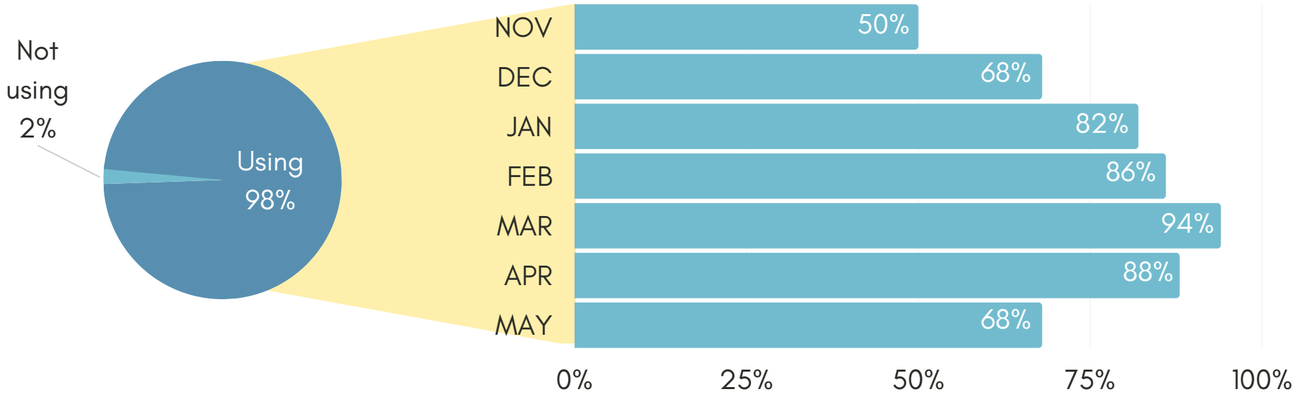
FREQUENCIES OF WATER PUMP USE

RAINY SEASON



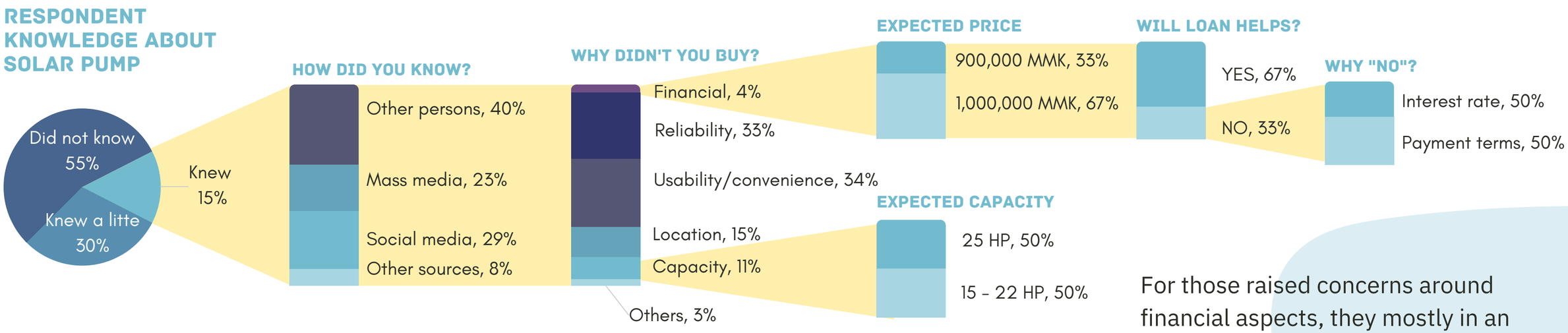
The use of water pump was high during the summer and winter (November to May) when pond water needs to be replenish to maintain pond water level.

SUMMER AND WINTER SEASONS



Given the over-reliance of aquaculture operations to the water from natural streams, where its water composition changes continuously, depending on climatic and seasonal conditions. It is the aim of good management to control the composition to yield the best conditions for the fish.

Respondents' knowledge on solar pump technology was very limited. Only few knew about it, while majority of them did not know or knew a little.



Word of mouth was the main source of information for those who knew well about the technology.

Social media and **mass media** were also playing an important role as information sources for participant who knew solar pump technology.

Concerns grounded on respondents' lack of understanding of **how to install, use and maintain** solar pump, their **long-standing experience of using diesel-powered pump**, and question around **solar tech reliability** were among the reasons given why the respondents did not transition to solar pump.

This was complemented with issues around **ability to make investment and price**, **lack of information on where to buy and capacity**.

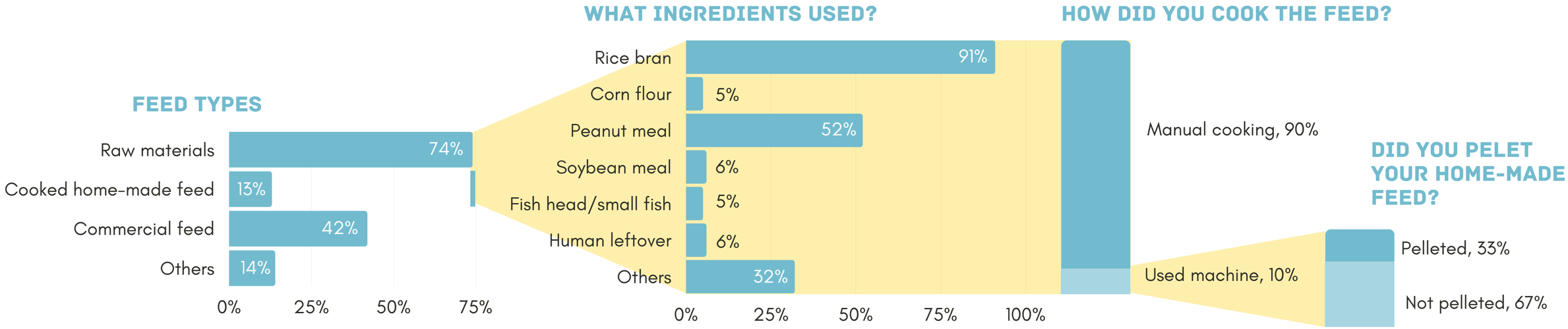
For those raised concerns around financial aspects, they mostly in an agreement that **affordable loans** could help them acquiring the technology.

But some others argued that existing loans have **high interest rate** and **unfavorable payment terms** (i.e., weekly or bi-weekly payments that don't fit well with aquaculture seasonal calendar).

06

INSIGHTS ON FEED MAKING MACHINE

Feeds and feed stuffs contain the energy and nutrients essential for the growth, reproduction and health of aquatic animals. Deficiencies or excesses can reduce growth or lead to disease. Dietary requirements set the necessary levels for energy, protein, amino acids, lipids (fat), minerals and vitamins



The use of **raw materials** as feed was very popular among respondents.

Less than half of respondents used commercial feed regularly, despite its superiority in terms of its compositions (i.e., sufficient amount of protein content important for growth).

Among those who cooked and/or use raw materials as feed, **rice brand** was used by most of them. Meanwhile **peanut meal** was the sought-after protein-rich ingredient.

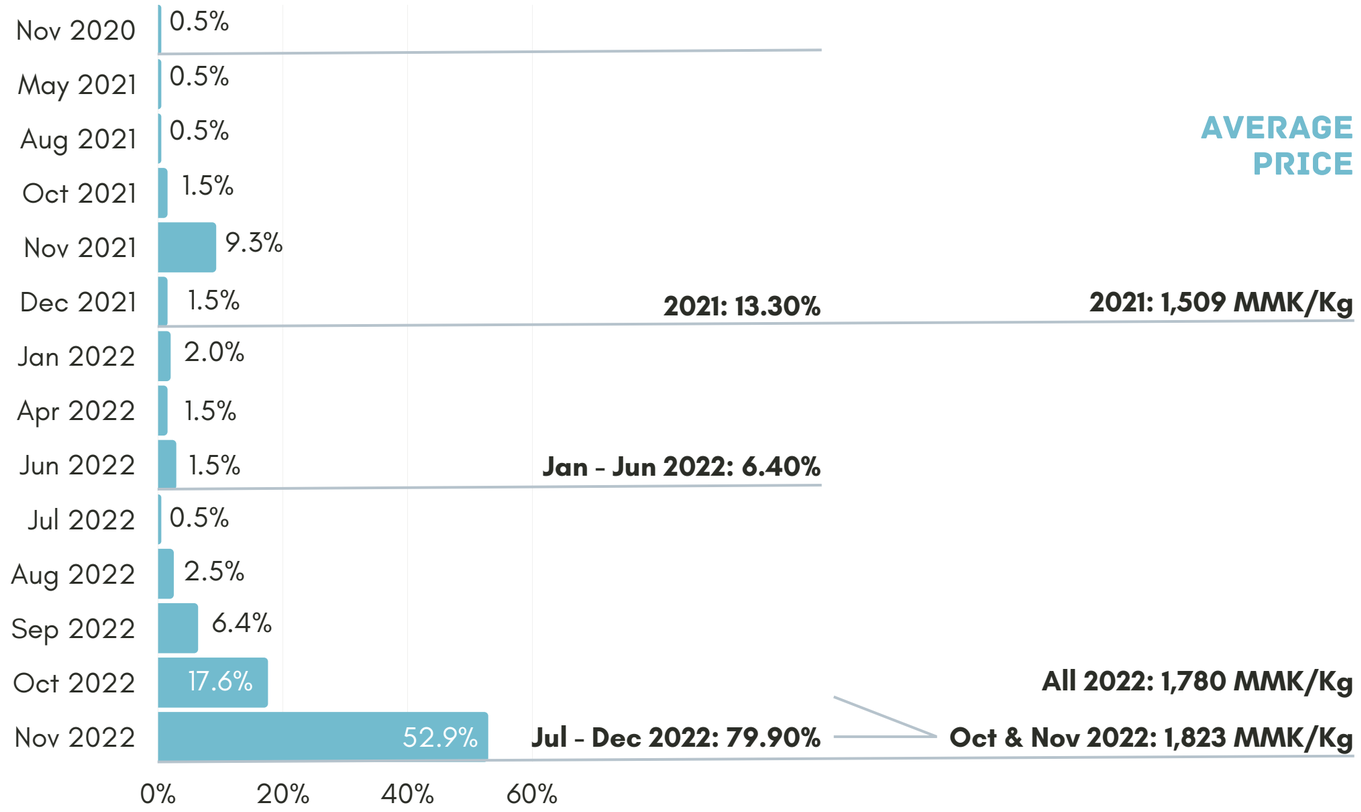
This may be due to the fact that rice and peanut are highly produced crops in the NGA-Myanmar target areas.

However, even when home-made feed are used, they were mostly **produced manually** (i.e., generally low quality) and **not pelleted.**

Non-pelleted low quality feed would be ineffective and resulted in excessive waste.

THE LAST TIME BUYING COMMERCIAL FEED

Despite the 'double crises' (i.e., COVID-19 Pandemic and events following the coup), most of respondents were still able to buy commercial feed (either regularly or irregularly) over the period of 6 months before this assessment.



AVERAGE PRICE

2021: 1,509 MMK/Kg

All 2022: 1,780 MMK/Kg

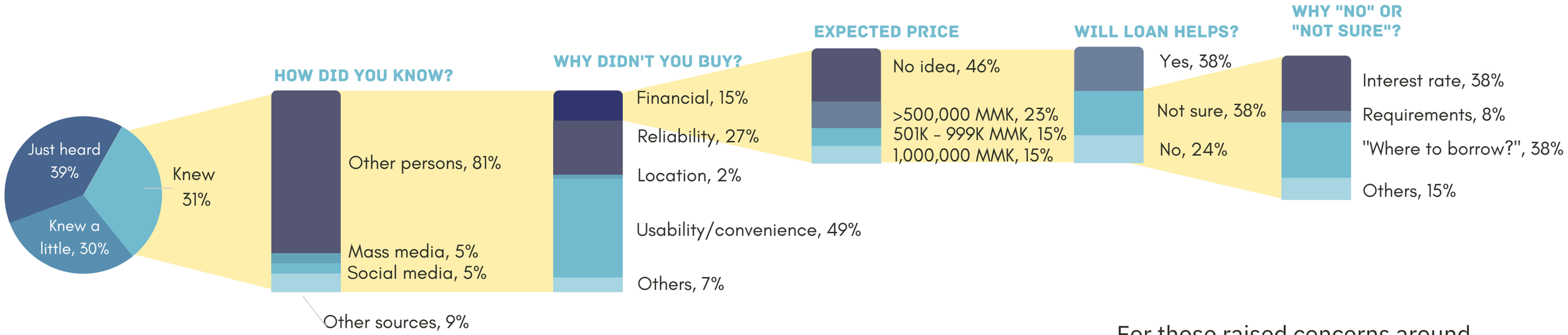
Oct & Nov 2022: 1,823 MMK/Kg

INFLATED PRICE BETWEEN 2021 - 2022

It provides **an opportunity** to promote home-made fish feed technology.

RESPONDENT KNOWLEDGE ABOUT SMALL-SCALE FEED MAKING MACHINE

Respondents' awareness on the improved feed making machine technology was relatively limited, although better than solar pump. Some know a little and the majority just heard about it.



Similar to solar pump, **word of mouth** seems to be an effective source of information for aquaculture operators.

Social media and **mass media** were not as key information sources for participant who knew feed making machine technology.

Concerns around **usability and convenience** factors as well as **reliability** of the technology were key areas to be further explored to address the current low adoption of the technology.

Issue around **financial**, like ability to make investment, lack of information on the price or where to buy, etc. were also an area to look at more closely to improve the adoption of the small-scale feed making machine among NGA-Myanmar target participants.

For those raised concerns around financial aspects, when asked if **affordable loans** will help them to acquire the technology, they mostly either said "yes" or "not sure".

For those who said "not sure" or "no", they argued that **interest rate, requirements,** and **"where to borrow"** were their major concerns.

CONTACT

WAH WAH CHO
Private Sector Engagement Coordinator | NGA-Myanmar
wcho@mercycorps.org

WAHYU NUGROHO
Team Leader | NGA-Myanmar
wnugroho@mercycorps.org

About Mercy Corps

Mercy Corps is a leading global organization powered by the belief that a better world is possible. In disaster, in hardship, in more than 40 countries around the world, we partner to put bold solutions into action — helping people triumph over adversity and build stronger communities from within. Now, and for the future.

45 SW Ankeny Street
Portland, Oregon
97204
888.842.0842
mercycorps.org