Lactation Curve based Digital Extension

BRIDGE Project

Activity Report I

PxD
PRECISION
DEVELOPMENT

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Executive Summary

This report summarizes the activities of Precision Development (PxD) in collaboration with SNV - BRIDGE project from August 2022 to February 2023. SNV and PxD partnered on the BRIDGE project to provide customized dairy advisory services that targeted the gestation stage of the cow, and improve milk yield through targeted interventions.

Building on the technical materials from BRIDGE, PxD developed digital advisory services for dairy farmers that targeted the lactation curve of dairy cows. As part of the digital advisory component of the Lactation Curve-based Intervention, PxD also produced an advisory video. The advisory service was intended to enhance the knowledge of dairy farmers about lactation stage-based interventions. Both for the mobile phone-based intervention and video, PxD employed a Human-centered Design approach to develop customized content for dairy farmers. The contents included cow comfort, dry-off, transition cow, early lactation, mid-lactation, and late lactation.

PxD pushed digital advisories through an outbound call system, and the service reached 2,513 farmers. With one attempt, the pickup rate for the call ranged from 64.8% to 79.7%. To improve the pickup rate by giving another chance to listen to the contents, PxD Ethiopia rescheduled almost all push calls to those farmers who didn't pick up the call at the first attempt. This coordinated effort enabled PxD to increase the average pick-up rate to 86.0%.

The qualitative assessments by the team indicate that the initiative on digital advisories for dairy farmers and service providers together with other integrated efforts of SNV - BRIDGE brought substantial improvements in the knowledge and milk productivity of dairy cows. PxD plans monitoring activity in the period between March to June to get a more comprehensive insight of the activity.

Introduction

Ethiopia has one of the largest livestock populations in Africa. Despite this large number of livestock and the potential for increased production, productivity and commercialization level is extremely low. Similarly, the country holds a large potential for dairy development. However, the dairy productivity and milk consumption level is low. The country produces approximately 4 billion liters of milk per year with 1.5 liters average productivity per day per cow and per capita consumption is estimated at about 20 liters.

The dairy production system in the country is constrained by factors contributing to this low productivity. First, smallholder farmers have limited access to improved dairy genetics. Improved exotic and cross-dairy animals are very few, constituting about 2% of the population[1], and they're often too expensive for smallholders to buy. Second, feed and water problems pose significant issues. Livestock mostly feed on poor-quality grass hay and crop residues. Supplementary feeds, like cereal bran and oil cakes, are either unavailable or too expensive[2]. Third, cow comfort is compromised with inadequate spaces, less ventilated barns, and uncomfortable floors. Fourth, weak animal health services substantially affect the productivity of the dairy production system. In addition, underdeveloped extension and market development systems all contribute to the low performance of the dairy system.[3]

SNV has currently been implementing the Building Rural Income through the inclusive Dairy business Growth in Ethiopia (BRIDGE) project to improve the dairy sector in Ethiopia. The BRIDGE project which is implemented by the consortium of SNV Ethiopia and Wageningen University and Research (WUR) works on all components of the dairy value chain, from production up to the end market, including consumption of nutritious food. Similarly, PxD works to support the dairy system through targeted and customized digital advisory services for dairy farmers in the country. With this common interest, SNV and PxD signed an MoU in June 2022 to systematically collaborate in areas of common interest and to improve the dairy sector in Ethiopia. BRIDGE and PxD are partnering to provide customized dairy advisory services that target the gestation stage of the cow, and improve milk yield through targeted interventions. The process will include group formation activities and targeted interventions through in-person extension (providers), print media (handouts), and mobile phone-based advisory services.

In this project, PxD was responsible for the digital advisory for the dairy system. SNV has developed the technical materials and contents that target the lactation stage of cows (*dry-off*, *transition*, *early lactation*, *mid lactation* and *late lactation*). Based on these technical materials, the PxD team further refined the contents through the application of a Human Centered Design approach. With due focus on farmers' needs and capacities, the application of the HCD approach has helped to refine contents to make them simple and actionable. These contents were then digitized (into audio and video) and disseminated to dairy farmers and service providers.

The initial qualitative assessments indicate that this initiative on digital advisories for dairy farmers and service providers together with other integrated efforts of SNV - BRIDGE brought substantial improvements in the knowledge and milk productivity of dairy cows. PxD plans monitoring activity in the period between March to June to get a more comprehensive insight of the activity.

Precision Development (PxD)

Precision Development (PxD) is an international development organization headquartered in the US and

[1] CSA, 2018. Livestock survey report. Livestock and Livestock characteristics report for 2017-18-2010 E.C
[2] Weldegerima, T. M., 2018. Characterization of productive and reproductive performances, morphometric and challenges and opportunities of indigenous cattle breeds of Ethiopia: A review, International Journal of Livestock Production, Vol.9(3), pp. 29-41
[3] Minten B, Habte Y, Tamru S, Tesfaye A (2020) The transforming dairy sector in Ethiopia. PLoS ONE 15(8): e0237456. https://doi.org/10.1371/journal.pone.0237456

specializes in delivering mobile-based agricultural extension services. PxD is pioneering a new model for eradicating poverty: delivering personalized advice to users and households through their mobile phones. By providing actionable information to the right people, in the right way and at the right time, PxD empowers poor people in developing countries to improve their livelihoods, increase their incomes, mitigate risks, and advance environmental sustainability. With a great focus on product development, experimentation, and iterations, PxD employs cutting-edge techniques by applying technology, behavioral economics, and data science to meet dynamic development needs.

PxD Ethiopia adopts the global strategy to fit into the needs and capacities of Ethiopian farmers by employing iterative product and service development techniques. PxD Ethiopia collaborated with key development partners including the Ethiopian Agricultural Transformation Institute (ATI), the Ministry of Agriculture (MoA), the Livestock Development Institute (LDI), the International Livestock Research Institute (ILRI), the Netherlands Development Organization (SNV), and many others.

Implementation of the Project

Product Development through a Human Centered Design Approach

PxD employed an HCD approach to develop targeted content for dairy farmers. The BRIDGE project staff provided us with the technical materials to develop content for the dairy farmers. The contents focused on the lactation stage of the dairy cattle and included cow comfort, dry off, transition cow, early lactation, mid-lactation, and late lactation.

The HCD approach included farm visits, analysis of the farms, and iteration of content to match with farmers' needs and capacities. With the aim to know the users and understand the pain points, we did

The first farm was outside Adet where the family led by a widow woman had one pregnant crossbred cow. The family put aside part of their main house as a barn for the cow, and the cow mostly relies on crop residues and hay. This cow provides about 5 liters of milk per day during the peak period.
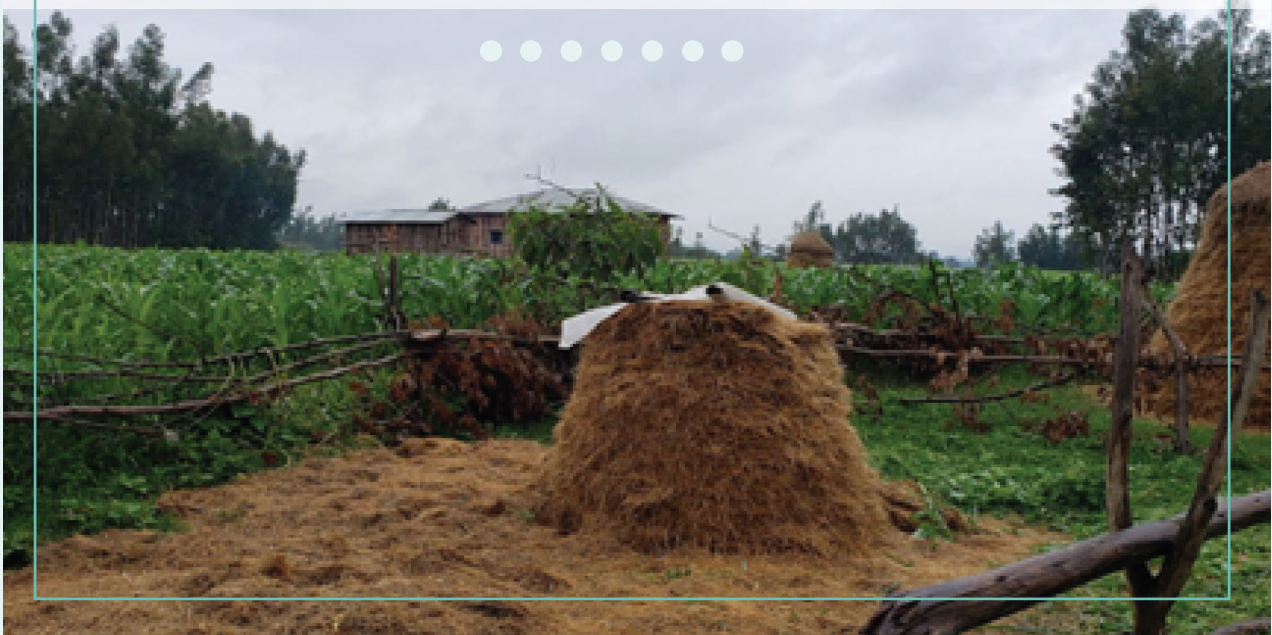
Photo taken by PxD staff

farm and dairy farmers' visits. The PxD team, together with the BRIDGE project team, visited dairy farms in Yilmana Densa woreda. The aim of this farm visit was to picture the dairy farms that we were targeting through the content, and through the application of the human-centered design approach, we aimed to

The second dairy farmer that the team has visited was a young man with three crossbred cows. The family had a separate barn for the cows, and we saw diverse feed products in the store. Two of the cows were lactating, and provided about 12 and 15 liters of milk per day.

Photo taken by PxD staff

come up with products and solutions that were tailor-made to suit their needs and capabilities.

Right after the field activities, the PxD program team has participated in two technical training sessions (Cow Signal and Silage Making) organized by SNV. These training programs have benefited the PxD team in gaining a deeper understanding of the subject matter. The knowledge gained and the materials gathered from the programs were used as primary inputs in the development of audio and video contents.

The key questions that we addressed through a human centered design approach included:

- What are the technical recommendations that farmers need to adopt to improve productivity/income? What are the priority behaviors that we want dairy farmers to adopt?
- What do farmers need to know in order to adopt the priority practices/ recommendations?
- What are the barriers to adoption and how can farmers overcome those barriers?

The technical contents and materials were refined against the above-listed questions through iterative processes. The aim of the process was to make sure that the product and contents that we produced suited the needs and capacities of beneficiaries. With this process, we developed 2 group formation-related contents (why do farmers need to participate in this project? What are the benefits of adopting the recommendations, etc.) and 11 core contents on the various recommendations that targeted the lactation curve of cows. The core contents were first developed in Amharic and later translated into Oromiffa and Sidamigna languages.

Delivering Targeted Push Calls

The selected 2,513 dairy farmers and 119 service providers in Amhara, Oromia, and Sidama regional states were targeted to receive advisory messages about the lactation curve through push calls. The push calls were scheduled based on times of the day suggested by the SNV team. It was usually scheduled between 18:00 and 20:00 during the day. In order to increase the number of targeted beneficiaries to pick up the advisory push calls, PxD communicated to SNV at what time the advisory messages push calls were scheduled and through the Telegram channel of SNV all the service providers were informed to let the farmers know about the schedule

Language Preference Survey

As part of an effort to make the advisory messages targeted to the audience, PxD Ethiopia conducted a

profiling survey of the beneficiaries. The request to refine the language matching also came from the dairy farmers and the BRIDGE project team. The language preference survey was conducted in Oromia and Sidama regions. Through this, we conducted dairy farmers profiling, and identified the language that the beneficiaries chose to receive the push calls.

Figure 1: Language preference survey metrics

The survey had the pick up rate of ~81%. Most of the farmers in this survey have never changed their language preference and for those who didn't pick up the phone, PxD Ethiopia has decided to proceed with the default language. Overall, the language preference survey has helped PxD to adjust the language of 282 dairy farmers.

Dairy Farmers and Service Providers Reach

Once the group formation was done by the SNV - BRIDGE project team, the PxD team developed and pushed group formation messages. The major goal of this group formation messages were to welcome dairy farmers to this group and share ideas on the project expectations.

Table 1: Summary of group formation messages

Group formation message	Delivered Calls - 1st attempt	Delivery Calls - 2nd attempt	Total calls	Pickup rate
M1 - *Welcome to the group*	1676	328	2494	80.4%
M2 - *Expectations*	1650	296	2494	78.1%

From the start of the project activity in August 2023 up until February 14, 2023, about ten advisory messages on the various stages of the lactation curve were pushed to targeted beneficiaries in Amharic, Oromiffa and Sidamigna languages. With the request from the SNV - BRIDGE team, we have also pushed timely heat detection related advisory to the farmers. A total of 39,224 calls were made to the dairy farmers and service providers, of which 23,128 calls were successfully picked up by beneficiaries.

Moreover, when farmers or service providers were unable to pick up the calls and listen to the contents for various reasons, we rescheduled the push calls for a second try. As shown in Table 1, there were several farmers who listened to the content pushed in the second attempt.

Table 2: Summary of push calls by advisory messages and beneficiary type

Advisory message	Calls made	Avg. audio length (sec)	Avg. time on a call (sec)		Pick-up rate (%)		Listening rate (%)	
			Dairy farmer	Service provider	Dairy farmer	Service provider	Dairy farmer	Service provider
M1 - *Cow comfort*	3421	154	184	226.7	69.3	42.2	84.9	96.4
M2 - *Dry off 1*	2868	115.7	146.4	171.0	68.1	78.9	87.6	98.6
M3 - *Dry off 2*	2603	82.6	116.8	124.1	65.3	80.7	90.2	95.7
M4 - *Dry off 3*	2603	67.9	86.1	89.4	64.8	82.6	75.6	76.3
M5 - *Transition*	3587	97.8	130.1	138.6	77.1	93.7	87.3	93.5
M6 - *Early Lactation 1*	3491	94.6	130.4	138.2	67.7	81.5	90.3	94.6
M7 - *Early Lactation 2*	3511	92.5	122.2	145.1	79.7	93.3	89.1	98.1
M8 - *Early Lactation 3*	7467	136.3	155.1	179.6	85.5	95.8	86.4	93.2
M9 - *Early lactation 4*	6122	118.62	141.0	145.2	83.7	93.3	85.9	90.5
M10 - *Heat Detection*	3551	126.8	156.3	166.0	75.6	88.2	88.0	93.6
Total	39224	113.3	139.4	151.7	92.9	98.3	86.6	92.8

The SNV - BRIDGE team often sends reminders in the telegram groups when the push call is scheduled. This coordinated effort to use telegram reminders for service providers, rescheduling etc. has enabled PxD to improve the average pick up rate to 86.0%. This figure has been recorded as a magnificent achievement for PxD Ethiopia. As expected, the pick up rate is substantially better for service providers.

As depicted in Table 2, relatively service providers were able to pick up the calls and listen to the contents more than dairy farmers. Moreover, there is no significant difference between male and female beneficiaries in terms of listening rate.

Table 3: Summary of push calls by region, gender and beneficiary type

Region	Gender				Beneficiary Type			
	Male		Female		Dairy farmer		Service provider	
	Pick-up Rate (%)[min, max]	Listening Rate (%)	Pick-up Rate (%) [min, max]	Listening Rate (%)	Pick-up Rate (%) [min, max]	Listening Rate (%)	Pick-up Rate (%) [min, max]	Listening Rate (%)
Amhara	[66.3,87.9]	85.8	[61.0,82.9]	84.1	[65.3,86.6]	85.5	[80.0,95.6]	98.7
Oromia	[64.0,85.9]	87.8	[62.5,82.7]	88.3	[65.3,85.0]	87.4	[74.5,98.0]	96.2
Sidama	[62.9,85.4]	87.1	[57.8,88.4]	83.4	[61.3,85.0]	86.2	[65.2,91.3]	91.5
	[66.1,87.9]	86.9	[61.2,82.9]	86.3	[65.3,85.5]	86.5	[42.2,95.8]	92.8

▌ Monitoring through Call Logs

The PxD team has done intensive monitoring for the push calls services through call logs. Each attempt is recorded in the call log, and this gives us an opportunity to do continuous monitoring activities. The average listening rate for all advisory messages pushed was 86.9%. *i.e.*, on average ~87% of the push call content was listened to by beneficiaries. Moreover, 36.3% of the beneficiaries were able to listen to the content twice or more for at least one of the advisory messages pushed. The shortness of the advisory message (~113.3 seconds) coupled with the timing of the push call and relevance of the matter has contributed a lot for the beneficiaries to listen to the advisory message push calls. On the other hand, 6.8% of the targeted dairy farmers didn't pick up any of the advisory push calls. However, this figure goes down to 1.7% for service providers.

Figure 2: The pattern of push calls pick up and listening rate: Over all, push calls scheduled on Saturday have greater pick up and listening rate
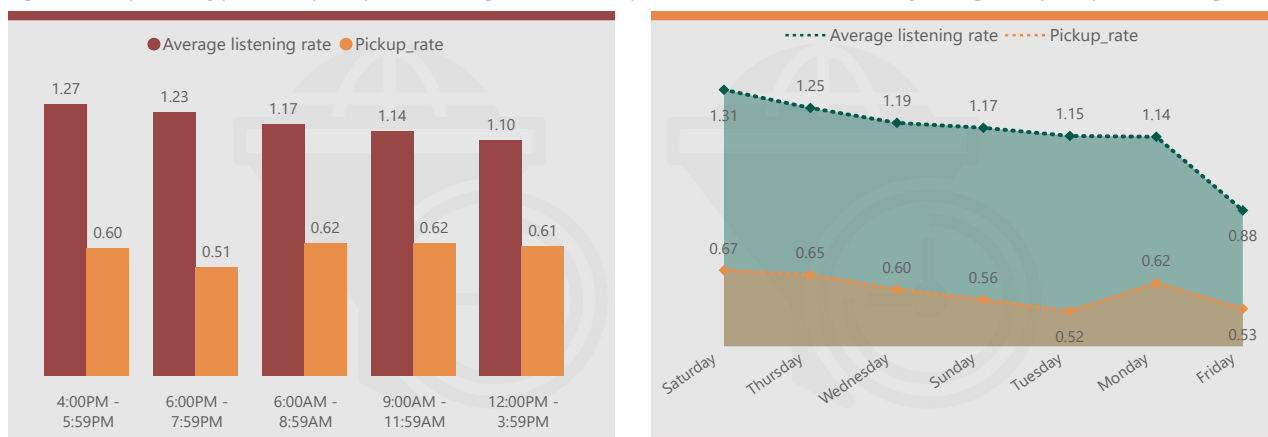
▌ Production and Dissemination of Advisory Videos

As part of the digital advisory component of the Lactation Curve-based Intervention Project, PxD produced an advisory video. The advisory video, which focuses on the newly introduced lactation curve-based intervention, complements the in-person extension (providers), print media (handouts), and mobile phone-based push call services addressed to targeted dairy farmers. With this advisory video, the project aimed at enhancing dairy farmers' knowledge about lactation stage-based intervention to improve productivity. It is also aimed to serve as a refresher for service providers. The video will be shown to farmers by the service providers during group evaluation meetings and/or one-to-one training sessions.

At the planning stage, a series of meetings were held with SNV-BRIDGE to identify the thematic focus of the advisory video, and select shooting sites based on a set of criteria. The HCD approach was followed at all stages of the production process, putting the dairy farmers at the center. Hence, the identification of the advisory messages (script) conveyed through the video corresponded to the dairy farmers' needs and wants. Based on the technical inputs from these series of discussions and employing the HCD approach, SNV - BRIDGE and PxD agreed on the key focus areas for the video. The design further considered facilitating the dissemination of accessible advisory videos at scale as the project expands its reach to more dairy farmers in the country.

Based on this, PxD prepared guiding material and provided orientation sessions to the video production team. After conducting an orientation to the video production team, the crew paid a one-day visit to one of the project sites around Fiche. This was helpful to get an understanding of the project before the commencement of the actual field work for shooting. The actual field-level video production was conducted successfully in selected sites in Amhara (North Mecha and Yilmana Densa woredas) and Oromia (Fiche) regions. The selection of video production sites was selected based on the progress reports submitted from all BRIDGE Project clusters. The reported best practices were listed out, evaluated, and ranked to finally do the selection. During the field video production work, SNV - BRIDGE project staff (from the head office to the woreda coordination offices) provided considerable coordination and operational support.

This is a young married man with two daughters, and has two cows and one heifer. After in-person & digital interventions from this project, the family has implemented improved dairy farm management practices including forage production, silage, modified the barn with soft bedding, ventilation and light, and keeps records. The cows were also fed concentrates and other feed resources that fit into the lactation stage of the cow. Furthermore, clean water and roughage were made available for 24 hours. As a result, milk production has increased by 5 liters of milk per day and the cow came to heat (and inseminated) in only 2 months after parturition.

Photo taken by PxD staff

In an effort to come up with effective video-based advisory services to the target dairy farmers, the video production team combined suggested best practices, farm and farmer experiences, and available resources. Through an HCD approach, the videos integrate field-based service providers' narration of key messages, real-life experiences of selected dairy farmers, and animations accordingly. We provided a strong focus on farmers' testimonials on their experiences and outcomes adopting best practices.

Lessons Learnt and Future Plans

▌ *Lessons Learned*

Through this process, PxD has gained the following lessons and learnings that the project could use to further expand the impact.

First, the key component of this project was its focus on the lactation curve to bring about a change. The initial assessments of the project showed that this worked out well. This supports the need to provide focused interventions to address the weakest links in dairy farms.

Second, the bundling of services and integration of interventions were critical in the implementation of this project. This project integrated in-person extension by service providers supported with digital

advisory services, dairy cooperatives and milk collection centers, and dairy input shops. This bundling likely contributed to the impact of the project.

▌ Ideas to Explore and Pilot for the Next Phase

In the implementation of this project from August 2022 to February 2023, the project team has identified ideas for future piloting and experimentation.

- ◀)) In order to enhance the reach and participation of women dairy farmers, we may include short introductory messages to encourage farmers to listen to the advisory together with their spouses and other family members in the push call. To facilitate group listening, we would advise farmers to listen to the call using the loudspeaker option.

- ◀)) To fit with farmers' busy schedules and set expectations, we would want to experiment with sending calls at the same time and day of every week. This would also be helpful for families to adjust particular times of the day (and week) to listen to the content as a group.

- ◀)) The field visits have indicated that dairy farmers require advisories around improved calf management. With the introduction of improved calf care techniques including optimal feeding practices, improved calf handling would reduce calf mortality, reduce milk wastage and this ultimately contributes towards dairy commercialization.

Conclusions

As an effort to improve dairy productivity through lactation curve targeted interventions, PxD provided digital advisory for the dairy farmers in the BRIDGE project. The advisories were through an outbound call system, and the service has reached 2,513 farmers. The contents include group welcome message, dry-off, cow comfort, early lactation and timely heat identification. The call-log data showed that the service was delivered to the majority with an average pick-up rate of 86.0%.

The average listening rate for all advisory messages pushed was 86.9%. This is an indication that beneficiaries were able to listen to the whole content of the push calls, on average. 36.3% of the beneficiaries were able to listen to the content twice or more for at least one of the advisory messages pushed.

According to the qualitative assessments by the team, this initiative on digital advisories for dairy farmers and service providers together with other integrated efforts of SNV - BRIDGE brought substantial improvements in the knowledge and milk productivity of dairy cows. PxD plans monitoring activity in the period between March to June to get a more comprehensive insight of the activity.