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Farmers Participation, Technology Transfers, and Capacity Building Under the Carabao Development Program (CDP)

Zedric Nicholas S. Bisenio

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Telephone: (02) 8981-8500 loc. 4266 to 4268 / (02) 8426-0955
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Carabao (Amorsolo, 1949)

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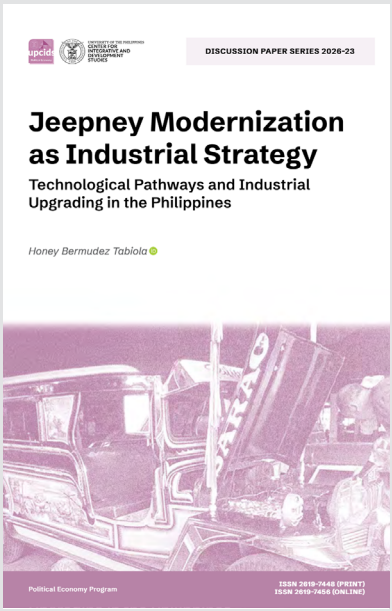

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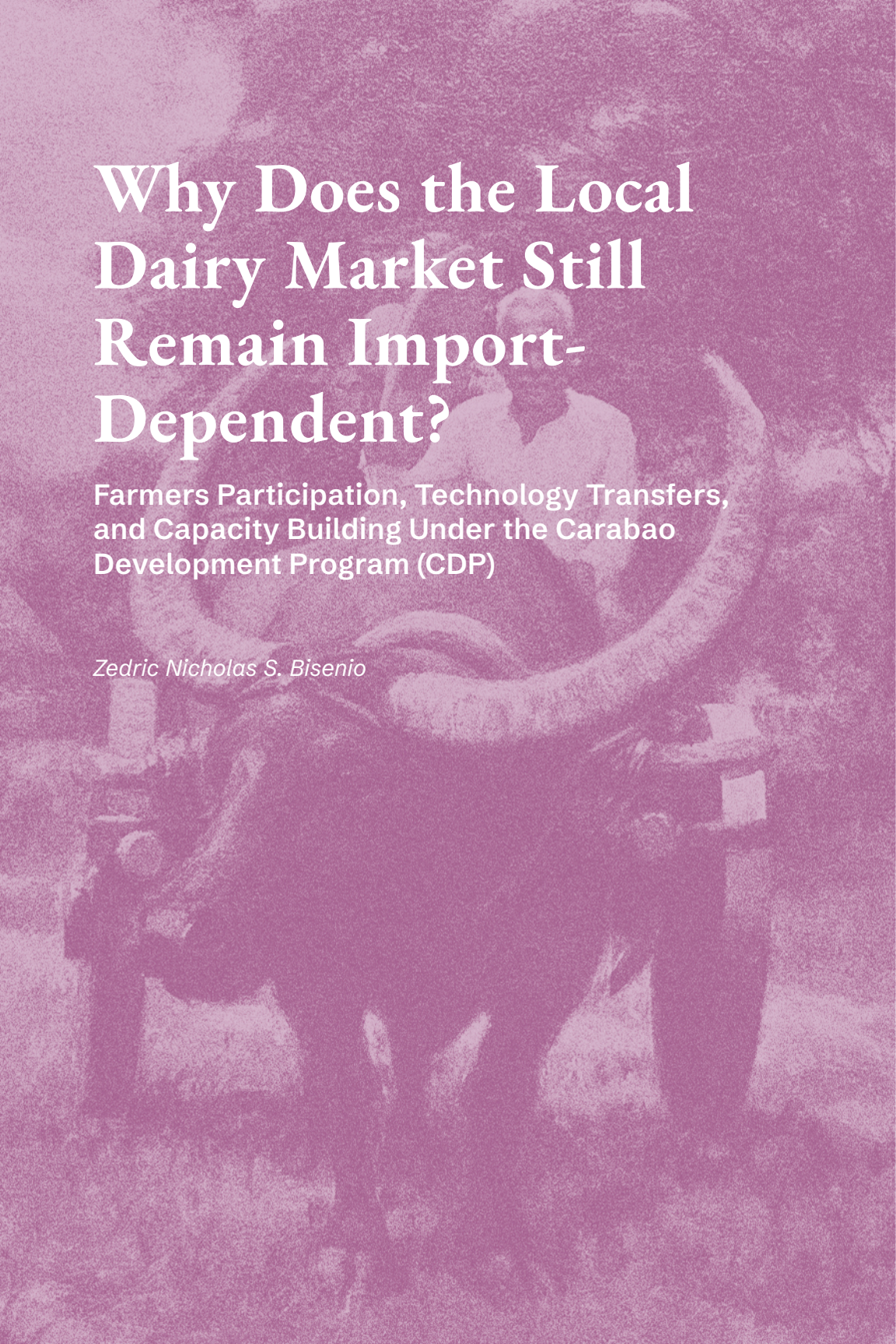

Why Does the Local Dairy Market Still Remain Import-Dependent?

Farmers Participation, Technology Transfers, and Capacity Building Under the Carabao Development Program (CDP)

Zedric Nicholas S. Bisenio

Key Takeaways

- The discussion paper examines why the local dairy market continues to procure 99 percent of its milk requirement from abroad despite the efforts of the government such as the Carabao Development Program (CDP) to accelerate local dairy production.

- To boost the local dairy industry, the Philippine Carabao Center (PCC) implements the CDP to address food security and poverty alleviation by transferring biotechnological innovations and entrepreneurial knowledge to smallholder farmers.

- The paper found that the CDP was able to increase the volume of carabao milk production but still falls short in meeting its yearly targets and in increasing the local dairy market share.

- The factors for the lackluster growth in carabao milk production, identified in the study, include: the inaccessibility of privatized artificial insemination services for carabaos, the limited small farmers' participation in carabao dairy farming due to steep administrative, financial, and skill requirements, and, the inability of the PCC to address subsistence farming.

- The paper recommends the alignment of CDP's antipoverty thrusts with the recently passed Animal Industry Development and Competitiveness Act (AIDCA). Specifically, the paper suggests the use of the Animal Competitiveness Enhancement Fund (AnCEF) to implement AIDCA provisions such as the condonation of smallholder farmers' debts, to distribute carabaos to DA-accredited cooperatives and groups, including agrarian reform beneficiaries (ARBs) associations, and to undertake research and development to make farming inputs more accessible to resource-poor farmers.

Acronyms And Abbreviations

- AI Artificial Insemination
- AIDCA Animal Industry Development and Competitiveness Act
- ANYO Agri-Negosyo Loan Program
- ARBO Agrarian Reform Beneficiaries Organizations
- CBED Carabao-Based Enterprise Development
- CBIN Carabao-Based Business Improvement Network
- CCDP Coconut-Carabao Development Project
- CDP Carabao Development Program
- CI Calving Interval
- CLOA Certificate of Land Ownership Award
- CSO Civil Society Organization
- DA Department of Agriculture
- DA-ACPC Department of Agriculture-Agricultural Credit Policy Council
- DAR Department of Agrarian Reform
- DepEd Department of Education
- DSWD Department of Social Welfare and Development
- DTRI Dairy Training and Research Institute
- EPAHP Enhanced Partnership Against Hunger and Poverty Program
- FCCT First Consolidated Cooperative Along Tanon Seaboards
- FDA-LTO Food & Drugs Administration-Land Transportation Office
- FLS-DBP Farmer Livestock School on Dairy Buffalo Production
- GIP Genetic Improvement Program
- LGU Local Government Unit
- MDDF Manlapaz-David Dairy Farm
- NDA National Dairy Authority
- NDA-LTO National Dairy Authority-License To Operate
- PCC Philippine Carabao Center
- PCC-ACPC Philippine Carabao Center-Agricultural Credit Policy Council
- RHA Rolling Herd Average

- SMAP St. Miguel Agustin Pro Learning Center
- TRLAFCO The Rosario Livestock Agricultural Farming Cooperative
- VBAIT Village-Based Artificial Insemination Technicians

Introduction

For the past years, there has been a growing recognition in the Philippine dairy industry of the potential to develop carabao milk into a high-value product that can raise incomes of small dairy farmers and revenues for agribusiness. Carabao milk, which is significant both in terms of its nutritional content and market value, can be processed into multiple dairy-based products ranging from pasteurized milk to ice cream.[1] With the projected rise of the Philippine national population at one percent annual growth, local dairy consumption has risen exponentially. One survey forecasted that the national milk consumption in 2024 will reach 3.5 million MT (Mojica-Sevilla 2023, 4).

As a response, the national government offers various programs to promote the production of dairy milk in the local market. Nevertheless, despite the growing domestic demand for carabao milk, local dairy farmers have been slow on the uptake, contributing roughly one percent of the local dairy market (Turaja et al. 2024). Thus, the paper asks: despite the government's efforts to promote local dairy milk, why does the national milk production still remain at one percent in market share?

To address the research question, this paper examined the government programs under the Philippine Carabao Center (PCC). The PCC is an attached agency of the Department of Agriculture (DA), established under Republic Act No. 7307 or the "Philippine Carabao Act of 1992" to boost the competitiveness of the local dairy market in meeting the growing national demand for milk. Specifically, the PCC prioritizes the "increase in carabao population and productivity, reproduction, breeding, nutrition, and health [of carabaos], enterprise development, and development of appropriate technologies that are cost-effective, simple, and practical" (Republic Act No. 7307).

To achieve this, the PCC implements the Carabao Development Program (CDP) that has the following objectives: (1) to propagate Philippine carabaos as a source of draft animal power, meat, milk, and hide, (2) to promote carabao-based dairy products as a high-value commodity, and, (3) to expand the local dairy industry's capacity to meet the growing national demand for

1 The high market value of carabao-based dairy products is derived from being niche commodities that can only persist in specific target markets, rendering the sustainability of an agribusiness without having to compete with established multinational corporations such as Nestle and Magnolia.

milk (Mingala 2021). In this sense, the CDP is focused on propagating native carabaos as a potential source for milk production, making carabao dairy farming an alternate source of income. The CDP also emphasizes carabao dairy production as an anti-poverty measure, highlighting (1) the livelihood opportunities of engaging in carabao dairy farming and (2) the nutritional content of local dairy milk as one of the solutions to address hunger in the countryside (DA-NDA 2022, 38; Austria 2024; Republic Act No. 11037).

Toward this end, the CDP provides training services and promotes the artificial insemination of carabaos to improve farmers' entrepreneurial skills and increase herd population, respectively. Such efforts of the CDP aim to improve smallholder farmers' participation in local dairy production while meeting the growing national demand for dairy products (PCC 2022).

The paper examines the CDP. In assessing the program's performance in increasing smallholder farmers' participation in carabao milk production, data-gathering included interviews with key informants,[2] participation in dairy training seminars,[3] and qualitative literature review.[4]

The discussion paper is organized as follows: the next sections briefly discuss the status of the Philippine dairy industry, examine the PCC-DA's Carabao Development Program, and assess dairy cooperatives and farmers that are recipients of the CDP and other PCC-related services. The paper ends with an analysis on the CDP performance in particularly in raising carabao milk productions and dairy farmers' income and give recommendations to address gaps in implementation.

2 The author interviewed former NDA administrator Sally Bulatao and former DTRI director Dr. Arnel del Barrio.

3 Participant-observation in dairy farming seminars, alongside smallholder farmers, in the Dairy Training and Research Institute's (DTRI) 63rd Anniversary Seminar Series.

4 Qualitative literature review includes training modules published by the Philippine Carabao Center (PCC), unpublished theses from the University Zof the Philippines – Los Banos (UPLB), and carabao agribusiness publications such as Karbaw and Carabalitaan.

Brief Overview Of The Philippine Dairy Industry

The Current Performance of the National Milk Production

There has been an exponential surge in the local dairy production for the past years, with an 11.4 percent increase or a total of 18.16 million liters of milk produced during the second quarter of 2025 (Sevillano 2025). Such trajectory is attributed to government herd build-up programs to increase the population of dairy animals, leading to the production of a total of 2.64 million liters of carabao milk (Cordero 2025).

Noteworthy, regardless of the growth in national milk production, Table 1 shows that 99 percent of the milk in the local market is still imported. National dairy production contributed 0.8 percent to the local dairy market in 2019, 0.9 percent in 2020, 0.8 percent in 2021, and 0.9 percent in 2022 and 2023. In other words, national dairy production has not exceeded the one percent mark in terms of the local market share.

In assessing the breakdown of local milk production, Table 2 shows a wide disparity between the NDA and the PCC in terms of milk production. The NDA contributed 70.6 percent in 2019, 75.7 percent in 2020, 77.1 percent in 2021, 72.4 percent in 2022, and 78.5 percent in 2023. In contrast, the contribution of the PCC was small: 16.7 percent share in 2019, 13.1 percent in 2020, 14.25 share in 2021, 14.56 percent in 2022, and 15.87 percent in 2023.

In this sense, the contribution of local carabao milk to national milk production is also only a drop in the bucket. Compared to imported dairy products, local carabao milk production had a share of 0.29 percent in 2019, 0.28 percent in 2020, 0.27 percent in 2021, 0.25 percent in 2022, and 0.21 percent in 2023 (Table 1). This indicates a decrease in terms of the contribution of local carabao-based dairy products in the overall local market share.

CARABAO MILK PRODUCTION, LOCAL DAIRY PRODUCTION, AND IMPORTED DAIRY MILK (In '000 L)	2019	2020	2021	2022	2023
IMPORTED DAIRY MILK	2,969.83	2,936.14	3,035.37	3,350.51	2,913
NATIONAL DAIRY MILK PRODUCTION	24.38	26.71	26.30	30.28	29.1
TOTAL CARABAO MILK PRODUCTION	8.67	8.26	8.47	8.58	6.24

Table 1. Carabao Dairy Production, Local Dairy Production, and National Milk Production.

Source: Philippine Statistics Authority, Philippine Carabao Center, and National Dairy Authority. Gathered and Processed by Bisenio (2025).

CARABAO MILK PRODUCTION AND NATIONAL MILK PRODUCTION (In '000 L)	2019	2020	2021	2022	2023
NATIONAL DAIRY MILK PRODUCTION	24.38	26.71	26.30	30.28	29.1
NDA-ASSISTED MILK PRODUCTION	17.22	20.23	20.29	21.93	22.83
PSA-REPORT ON CARABAO MILK PRODUCTION	8.67	8.26	8.47	8.58	6.24
PCC-MONITORED CARABAO MILK PRODUCTION	4.08	3.50	3.75	4.41	4.62

Table 2. Carabao Dairy Production and National Milk Production.

Source: Philippine Statistics Authority, Philippine Carabao Center, and National Dairy Authority. Gathered and Processed by the author.

Finally, despite growth in local milk consumption due to the expanding national population, the Philippine dairy industry has one of the lowest national milk productions in comparison to its Southeast Asian neighbors (DA-NDA 2022, 13). In 2020, with a population of 109.58 million people, the Philippines only produced 14,865 tons of milk. In comparison to Thailand, Indonesia, and Vietnam respectively produced 653,928 tons, 909,638 tons, and 936,003 tons of milk (ibid, 14).

Currently, there are government attempts to accelerate the national dairy performance. One of which is Republic Act No. 12308 or the "Animal Industry Development and Competitiveness Act" (AIDCA) that was enacted last September 25, 2025 to collect tariffs from imported agricultural products to boost local industries such as the dairy sector (Cordero 2025). Such funds are needed to increase state intervention in an import-dependent market. Specifically, collected tariffs serve to expand the regulatory functions of the NDA and PCC to expand the herd population (Barro 2026).

The Socio-Economic Conditions of Philippine Smallholder Dairy Farmers

A factor cited in the low production of carabao milk in the country is the socioeconomic conditions of the smallholder dairy milk farmers (Lantican et. al. 2017; Ibana et al. 2025). Studies show that Philippine smallholder farmers, who have a herd size of only two to four cattle, earn an income of around PHP 15,000.00 per month.[5] They are also landless and so rent around three hectares, which is below the global definition of smallholder farming, where farmers can work on 10 to 500 hectares of land (Andrade 2016). Carabao farmers share the basic characteristics as other smallholder dairy farmers. For one, the PCC characterize them as engaged in subsistence farming (PCC n.d.). Renting small hectares on land with a meager monthly income, Philippine smallholder farmers have no choice but to shoulder high financial costs such as purchasing quality feeds to maintain consistent milk yields (Del Barrio 2025).

5 This data was cited in Mark Angelo Borja' presentation entitled "Linking profit, people & planet through sustainable dairy" in the 63rd Anniversary Seminar of the Dairy Training and Research Institute (DTRI) last November 3, 2025.

Further aggravating the farmers' situation is their heavy reliance on external stakeholders such as middlemen and other market forces to navigate the dairy market (PCC 2022, 55). Middlemen, dairy cooperatives, and milk processors have relatively strong connections with the local market in comparison to landless dairy farmers. Middlemen distribute fresh milk to processors and dairy cooperatives, where the latter can transform raw milk into different dairy products. This suggests that smallholder farmers seldom have access to market information such as the actual value of their milk. Consequently, farmers are often exposed to market manipulations with middlemen who buy their raw milks and dairy products way below market value (PCC 2022, 55). In this arrangement, middlemen and cooperatives could claim big portions of the revenues, leaving smallholder farmers deprived from the value-adding benefits of their own products.

Overall, due to their tight socioeconomic conditions, smallholder farmers, especially carabao farmers, engage in subsistence milk production. In the author's interview with former director of the Dairy Training and Research Institute Dr. Arnel N. del Barrio (2025), Philippine dairy farmers undertake milk production mainly to meet their basic needs, prioritizing survival than long-term expansion.

The Carabao Development Program (CDP)

Towards uplifting the lives and livelihood of smallholder farmers, the PCC implements the Carabao Development Program. Its primary thrust for carabao dairy development is the genetic upgrade of Philippine carabaos. To achieve this, the program focuses on maximizing the economic potentials of crossbreeding riverine buffaloes with Philippine carabaos and maintaining "the existing germplasm of the native animals and at the same time establishing gene pools of elite animals" (PCC n.d.).[6]

6 The reason behind this is that native carabaos can only yield an average of 4.5 liters while crossbreed carabaos can reach to a maximum of 20 liters (Cruz 2017).

The CDP's first phase is the Genetic Improvement Program (GIP), aimed to provide affordable breeding services to small farmers and offer a cost-efficient alternative to increase the herd population in comparison to importing expensive live buffaloes. The GIP establishes gene banks, consisting of imported Murrah and indigenous carabao genes, and mobilizes village-based artificial insemination technicians (VBAIT) to distribute frozen semen to farms to assist in the artificial insemination of the carabaos[7] (Cruz 2017).

To further expand the reach of VBAITs, the PCC privatized Artificial Insemination services for carabaos since 2006 (Cruz et al. 2013). Behind the need for privatizing AI services is the inaccessibility of breeding services conducted by Local Government Units (LGU) for the past decades (Cruz et al. 2013, 286). As per Cruz et al, this is due to the budgetary constraints in mobilizing AI technicians. In this sense, privatizing AI services intends to increase the number of semen processing laboratory and the recipients of VBAIT trainings (Cruz et al. 2013, 286). However, despite the effort to privatize AI services, there is still a high percentage of VBAITs that remains inactive (PCC 2022). As a result, AI services have only reached 5.8 percent of the entire population of breedable female carabaos, making breeding services still inaccessible to resource-poor farmers (DA-NDA 2022).

Aside from the genetic improvement of local carabaos, the CDP prioritizes promoting dairy farmers' competitiveness through its Carabao-Based Enterprise Development (CBED). Under the CBED, technical assistances such as dairy training seminars for proper milking hygiene and farming management are provided to dairy farmers. The trainings are done to make dairy farmers competitive in the local market and improve the quality and quantity of local milk to meet national demand (Villanueva 2023).

Boosting the market competitiveness of local farmers is needed to incorporate their products into the market. As a program that "allows poor livestock producers to have secure and adequate access to basic production inputs", the CDP's CBED strengthens partnerships between small dairy farmers and the public-private sector through the Carabao-Based Business Improvement Network (CBIN) and Coconut-Carabao Development Project (CCDP) (Cruz 2017). These programs intend to expand the local carabao "production base" (ibid). One of the initiatives of CBIN and CCDP is distributing carabaos to

7 Priced at the maximum of PHP 1,000 per carabao (PCC n.d.).

dairy cooperatives and coconut farmers, who go into carabao dairy farming can improve their farming operation.

Coupled with the improvement of the market competitiveness of local farmers is the provision of a ready market for their dairy milk. To achieve this, the CDP is incorporated into the food security and poverty alleviation agenda of Republic Act No. 11037 or the "*Masustansyang Pagkain Para sa Batang Pilipino* Act." In combating malnutrition and poverty, the Act assigns the PCC as one of the agencies that will incorporate "fresh milk and fresh milk-based food products" to national milk feeding programs (Republic Act No. 11037). As such, the milk feeding programs are opportunities for carabao dairy farmers to distribute their dairy products into the local market.

Moreover, the CDP's efforts to improve the livelihood of small dairy farmers include penetrating niche markets and transforming the nutrient-dense properties carabao milk into high-value dairy products. Rich with high calcium, low cholesterol, and probiotic functions, carabao milk is promoted to health-conscious markets such as school feeding programs (DA-NDA 2022, 35).

Carabao Development Program as a Farmers-Upliftment Model

Dairy cooperatives and farmers must be competitive to become recipients of the CDP. Reiterating the PCC's mission of "improving competitiveness and profitability of the livestock industry stakeholder through animal biotechnology, technology development, innovation, knowledge management, enterprise development" (PCC n.d.), the CDP seeks to strengthen the capacity of farmers to ensure the quality and quantity of carabao milk for the milk feeding programs (Mingala 2021). Mingala further adds that the CDP relies on both technology and knowledge transfers in uplifting small farmers by distributing biotechnological innovations.

The CDP's model for uplifting smallholder farmers is the PCC Strategy Map. The model highlights the steps on ensuring the "socio-economic empowerment of farming communities" (Mingala 2021). In Figure 1, strengthening the farmers' capacity to expand their operation is the fundamental requirement of "human development and poverty reduction" (Figure 1). To achieve this, the PCC's Strategy Map's baseline for empowering farmers includes the "judicious

use [of funds]." Entrepreneurial behaviors such as understanding how to navigate the local dairy market and investing in breeding services are taught in order to have "consistent clients and partnerships." In this sense, the CDP teaches the farmers to be proactive in expanding their farming operations to have a ready market.[8]

For farmers to prove their competency, they must have "complied with applicable statutory, regulatory, and contractual requirements" (see Figure 1). Specifically, they need to get accreditations such as the Civil Service Organization (CSO) and National Dairy Authority-License To Operate (NDA-LTO) so that they can distribute their dairy products in Food & Drugs Administration-Land Transportation Office (FDA-LTO) accredited outlets (PCC n.d.).

Under the "Dairy Safety Regulations" of 2019, the registration fee for accreditation is PHP 500.00, the application fee for LTO is PHP 100.00 (valid for one year), the renewal fee for LTO accreditation is PHP 300.00 (valid for three years), and the LTO accreditations for dairy farms can reach to PHP 50.00 per cattle (Article VIII). Failure to renew LTO will be result to a fine of PHP 50.00 per month (Section 3.1). In addition, as per the Regulations, dairy farms are required to submit a Risk Management Plan wherein farmers must prove that they are capable of controlling risks such as health hazards in their farming operation (Article VII, Section 4.3). Violating any of these provisions will result in a fine ranging from PHP 50,000.00 to PHP 300,000.00 (Article XIII, Section 1).

Requiring accreditation ensures that dairy farms produce milk that is safe for human consumption, their herd do not suffer from communicable diseases, the dairy milk does not "contain biological, chemical or physical hazards," and that farmers undertake "cleaning, sanitation, waste management, and pest control of the dairy farm" (DA-NDA 2019). The assurance for safe dairy consumption also includes financial and scientific literacy in practicing proper hygiene in farm productions as well as providing quality milk for the local market. However, Dr. Del Barrio (2025) asserts that there are several imported dairy milks in supermarkets whose health hazards are questionable, escaping

8 The key point in such model is that it begins on the need for biotechnological innovation coupled with the 'agency' of farmers to be independent, that policies which incentivizes proactiveness can help farmers transcend their socio-economic constraints (Beato 2025).

the oversight of the DA.[9] This means, without disregarding the need for safety milk consumption, the DA's implementation of the Dairy Regulatory System is relatively lenient to imported dairy products while imposing stricter measures for local dairy farmers.

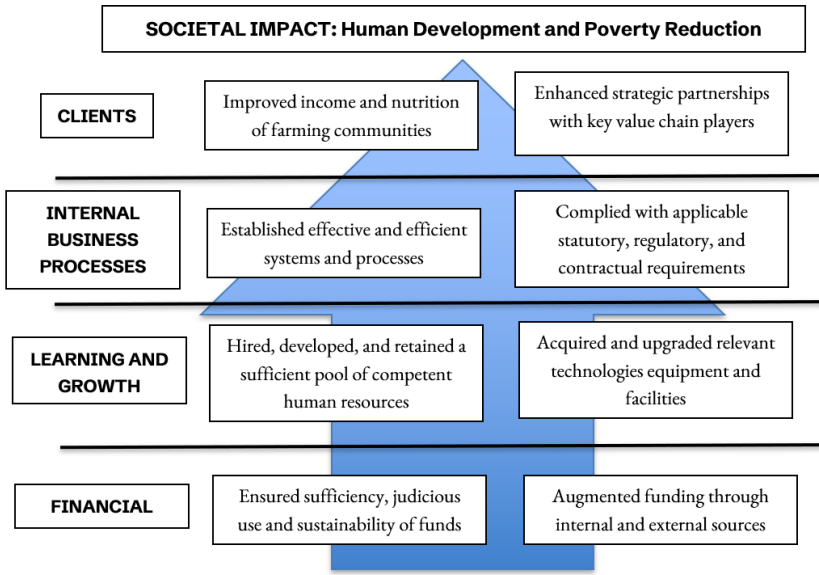

Figure 1. The PCC Strategy Map. Mentioned in Mingala's September 30, 2021 lecture in Xavier University.

To ensure a "sufficient pool of competent human resources," the PCC implements dairy training such as the Farmer Livestock School on Dairy Buffalo Production (FLS-DBP) to promote scientific and financial literacy among farmers (Mingala 2021). As government agencies for training dairy farmers, the PCC and the Dairy Training and Research Institute (DTRI) published modules that highlighting the concepts of "profitability," "competitiveness," and "sustainability" as the key factors for training farmers on practicing proper feed managements, managing breeding services, and maintaining milking hygiene (DTRI 2024).

9 In the author's interview with Dr. Del Barrio, the latter questions the label of "Fresh Milk" in imported products that usually took days and weeks before reaching the supermarket. For him, this contradicts the meaning of "Fresh Milk" where it should only take a few days before reaching to the consumers.

Modules on Assessing Carabao Business Performances

The PCC also produces modules on taking advantage of the market opportunities from practicing proper feed managements, breeding services, and proper milking hygiene (DTRI 2024). According to Sanchez et. al. (2009, 328), "biological factors such as animal health, genetics, and nutrition...can greatly affect the over-all performance of the herd." Therefore, financial and production performance is also seen as a function of practicing proper hygiene, artificial insemination, and proper feed management (Sanchez et al. 2009, 328). In this sense, herd performance is linked to the herd's biological factors such as genetic improvement and health since they are crucial in the overall production of quality carabao.

Assessing production performance can be divided into two factors. One, the Rolling Herd Average (RHA) assesses the volume of carabao milk production in the previous year.[10] Two, Calving Interval (CI) assesses the interval time between two successive calvings of the same female cow.[11] The significance of RHA and CI is that farmers can understand the lactation and dry period of their carabaos (Sanchez et al. 2009, 330).

Tracing a carabao's lactation and dry period are significant for farmers to understand the optimum point within the lactation cycle when quantity and quality of milk would have the most yield. This period is also when the highest profitability can be realized (See Figure 2 for the visualization). Attempting to milk the carabao beyond this peak will regress to breakeven and, eventually, net losses.

Farmers who understand their herds' lactation period can access multiple market opportunities (Sanchez et al. 2009; DTRI 2024). First, revenues can be generated during the dry period when high-value dairy products such

10 RHA is computed by multiplying the Total milk production for 12-months period in kg with 365 days and then dividing the product by the number of days the cow was in the herd over the 12-month period (Sanchez et al. 2009).

11 The CI is computed by dividing the interval (in days) between the previous calving and the current calving by 30.5 (Sanchez et al. 2009).

as pastillas can be processed (Turaja et al. 2024, 3-4). Second, even when the carabao is old and unable to produce milk, carabao meat can be sold to the market (Sanchez et al. 2009, 345).

However, accessing these market opportunities are only conditional if farmers can take on financial risks in investing in genetic improvement, proper hygiene, and feed management (Sanchez et al. 2009, 346; DTRI n.d.). This suggests that part of training carabao farmers is to make them aware of the high financial costs to maintain the health of the herd and the quality of fresh milk (Del Barrio 2025). In this sense, dairy farmers must consistently monitor herd behavior, trace the gestation period of the herd, and oversee their pasture. The failure to do so increases the possibility of the herd having a longer dry period (Sanchez et al. 2009). This entails that smallholder dairy farmers have to be "risk takers" in order to aim for the optimum level of milk yield during the lactation period, and that accrued revenues must be expended towards the long-term investments of maintaining the overall milking production (Del Barrio 2025).

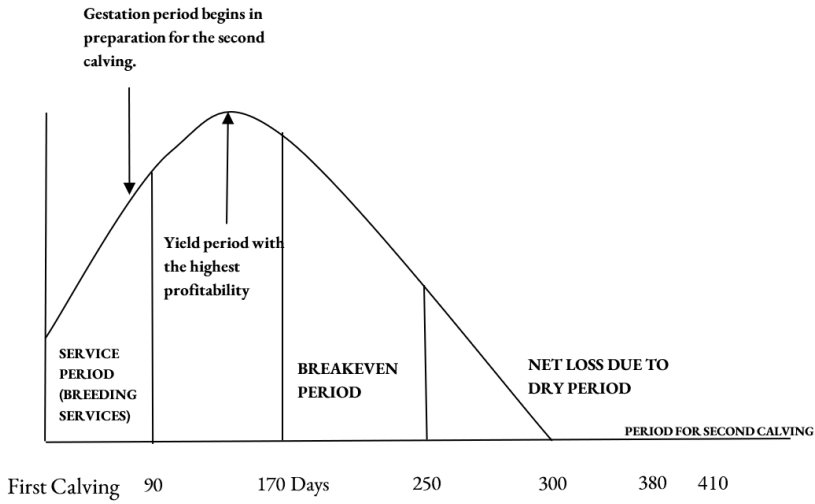

Figure 2. Calving Interval and Lactation Period mentioned in Sanchez et al. (2009).
Graph Processed by the author.

Entrepreneurial strategies of CDP-partnered dairy farms and cooperatives

The CDP-trained dairy farmers and cooperatives are expected to invest in the genetic improvement of the herd, take entrepreneurial risks to grow their agribusiness, and find "other revenue-generating opportunities that farm managers can maximize" (Sanchez et al. 2009, 350). For the CDP, such proactive behavior indicates the farmers and cooperatives' competency in delivering the required quality and quantity of milk that, in turn, would qualify them to participate in the government feeding programs. Examples of these dairy cooperatives and farms are the First Consolidated Cooperative Along Tanon Seaboards (FCCT), the Rosario Livestock Agricultural Farming Cooperative (TRLAFCO), and the Manlapaz-David Dairy Farm (MDDF). The different entrepreneurial strategies they employ are highlighted in the PCC magazine, *Karbaw*.

Service Diversification and the First Consolidated Cooperative Along Tanon Seaboards (FCCT):

Dairy farming has a set of transferable skills: a farm manager who is adept in financial management can extend microfinancing services, a farmer who is well-trained in animal husbandry can educate future farmers on technical know-hows, and one who is a well-versed entrepreneur can lend consultation services to other farmers.

These characteristics are embodied in the FCCT. Prior to being a dairy cooperative, it was engaged in the microfinancing and mining industries.[12] These previous experiences financially prepared the FCCT to engage in carabao dairy farming. In collaboration with the DA-PCC, the FCCT gave trainings and seminars in carabao meat and milk processing for the children of farmers in order to encourage them to engage in carabao dairy farming (Pascual 2024). Eventually, the PCC partnered with the FCCT to manage the CDP's Dairy Box in Cebu (PCC n.d.).

12 The First Consolidated Cooperative Along Tanon Seaboards (FCCT) was the consolidation of Atlas Consolidated Mining Development Corporation (ACMDC) and the Don Andres Soriano Credit Cooperative, Inc. (DASCCI) (Karbaw 2024).

In due time, the dairy cooperative was able to diversify its services, expanding their operations to include lending services, saving services, insurance services, and agribusiness services (Pascual 2024). Recently, they ventured into educational services such as the St. Miguel Agustin Pro (SMAP) Learning Center and water refilling services such as the FCCT Spring Water Refilling Station. FCCT also provide agribusiness services to other farmers such as producing Takakura fertilizer, planting cacaos, as well as breeding chickens and swine.

Product Diversification and The Rosario Livestock Agricultural Farming Cooperative (TRLAFCO)

The Rosario Livestock Agricultural Farming Cooperative (TRLAFCO) from Rosario, Batangas began by selling coconuts, rice, corn, and other fruits and vegetables to public markets (Canute 2023). Prior to being an accredited cooperative in 2019, the TRFALCO already had members who had been trained by the PCC to navigate the dairy market right from the beginning (Saez 2024).

Such training and experiences, which enabled TRFALCO to diversify their product line, gave it a competitive edge. The cooperative was able to turn raw carabao milk into *kesong puti*, pastillas de leche, and mozzarella cheese. Such strategies were recognized by the DA-PCC. After earning multiple awards for their contribution to livestock production, TRFALCO was one of the accredited dairy cooperatives to supply milk to the milk feeding program (CDA 2023).

Multiplier Farming and the Manlapaz-David Dairy Farm (MDDF)

Multiplier farming is a strategy where farms achieve self-sufficiency in increasing the herd population and producing quality feeds for this growing population. In this respect, the Manlapaz-David Dairy Farm (MDDF) in Porac, Pampanga is a prime example.

The MDDF is owned by Rabbi David, a medical technician from New Zealand and Camille Manlapaz, a Food Technologist from Italy (Antonio 2023). Rabbi David had his dairy farming training from New Zealand and also took courses in Health Care Management from the Cornell Institute of Business and Technology.[13] As a result, he was able to transfer his dairy farming knowledge from New Zealand to Philippine carabao farming and, partnering with his uncle, Nile David, an animal science consultant, to adapt artificial insemination services to grow his herd. To feed this growing herd population, he bought a forage chopper — which could cost up to PHP 25,000.00 per unit depending on the farming scale — in order to lower the cost of quality feed production.

Along the way, Rabbi David and the Manlapaz family taught carabao farming techniques to Aetas to give them jobs in their dairy farm. It was also during this period when the Manlapaz family saw the potential of forming a dairy association that will help other carabao dairy farmers.

With an impressive entrepreneurial portfolio for accessing technology that is appropriate for small-scale farming, MDDP eventually received technical assistance such as Carabao-based Enterprise Development (CBED) trainings in dairy product diversification from the PCC at Central Luzon State University. With the help of the CDP, the MDDF was able to introduce Puklo Yogurt Chips (yogurt chips made out of carabao milk) into the local dairy market (PCC 2025).

Assessing the Success Indicators of the Carabao Development Program

As per the DA *Official Gazette* (2022), the success indicators of CDPs are (1) the increase in the number of farmer recipients of genetically improved carabaos, (2) the rise in program beneficiaries' incomes, and (3) the increase in the number of technology adaptors (DA 2022, 15). Reviewing the figures during the period from 2022 to 2024 on these indicators is instructive on CDP's performance.

13 Rabbi's information found in his Linkedin profile: linkedin.com/in/rabbi-manlapaz-1a293911b?originalSubdomain=nz

Number of clients

Year	Outcomes (Percentage increase in the number of clients of genetically improved buffaloes (crossbred owners)	Targets
2022	5%	*
2023	5%	5%
2024	5%	5%
2025	5%	5%
2026	*	5%

*Unavailable data
Table 3. The CDP's percentage increase in the number of clients of genetically improved buffaloes
Source: Department of Agriculture
Gathered and Processed by the author.

As per Table 3, the CDP was able to meet its target of increasing the number of clients of genetically improved carabaos at five percent since 2022. Noteworthy, however, is that the target of five percent has not increased over the years.

Increase in family incomes

Year	Outcomes (Percentage increase in the family income from dairy carabao-based enterprises (crossbred owners)	Targets
2022	10%	*
2023	10%	20%
2024	20%	20%
2025	20%	20%
2026	*	20%

*Unavailable data
Table 4. The CDP's percentage increase in the family income from dairy carabao-based enterprises
Source: Department of Agriculture
Gathered and Processed by the author.

Table 4 shows an increase in income among farmer beneficiaries, thus illustrating that the CDP met its target percentage in improving the income of dairy farmers. From 2022 to 2023, the rate of increase in incomes is 10 percent. In 2024 and 2025, the rate of increase in incomes improved to 20 percent. In this sense, there is a 10 percent improvement in terms of uplifting farmers' incomes. However, such data suggests that the upliftment of smallholder dairy farmers under the program is only incremental.

Number of technology adopters/users

Year	Outcomes (Percentage of technology adopters/users)	Targets
2022	20% in 3 years	*
2023	20% in 3 years	25% in 3 years
2024	20% in 3 years	35% in 3 years
2025	35% in 3 years	35% in 3 years
2026	*	35% in 3 years

Table 5. The CDP's percentage of technology adopters/users
Source: Department of Agriculture
Gathered and Processed by the author.

Table 5 has shown that the CDP succeeded in going beyond the targeted rate of technology adopters. In 2023, the CDP targeted a 25% increase in technology adopters in three years. But even in just two years, the CDP had a 35 percent increase, making the program efficient in technology transfers.

Volume of Milk Production

Accomplishment Reports (in million liters)	Dairy Road Map (DRM) Target for Carabao Milk Production	Actual Accomplishment of the Carabao Development Program
2013	8.96	1.52
2014	10.2	1.62
2015	11.54	2.2
2016	12.99	2.71
2017	7.46	2.96
2018	16.62	3.15
2019	*	4.08
2020	*	3.50
2021	*	3.75
2022	*	4.41
2023	*	4.62

*Unavailable data
Table 6. DRM Targets vs CDP Accomplishments for 2013-2023
Source: DRMs and PCC Accomplishment Reports for 2013-2018, Commission on Audit, and Philippine Carabao Center.
Gathered and Processed by the author.

Although it is true that the CDP has made strides in increasing the volume of carabao milk (PCC n.d.; Duerme-Mangasar 2025), Table 6 shows that the volume of carabao milk produced is way below the target (see Table 6). Despite the CDP's efforts in upgrading the genetics of local carabaos and training carabao dairy farmers, the CDP still misses its own annual targets. Despite the unavailable data regarding the annual carabao dairy milk production targets from 2019 to 2023, the increase of carabao milk production is still slow.

Analysis And Conclusion

Based on the CDP success indicators of the past four years, there had been an improvement in the increase of technology adaptors and income among CDP program participants (Table 3 and 4). However, the volume of carabao milk production had been way below the target set by the PCC (Table 1 and 6). Moreover, for the period of 2019 to 2023, the production of carabao milk had been less than five liters (Table 2) or about one percent of the national demand for dairy milk (Table 1).

Despite the growth in the quantity of local carabao milk (Table 6), the contribution of such growth towards a self-sufficient local dairy industry is very minuscule. This means that the CDP also falls short in accelerating carabao milk production. As the findings suggest, while the program was able to raise the incomes of program participants by 20 percent, it did not have an impact on the carabao milk's contribution to the national milk consumption (which remained at around one percent).

This has implications on the effectiveness of CDP's strategies to raise carabao milk production. The findings from the study of CDP suggest that the factors for the limited impact of government's programs would include the following: (1) the local dairy industry's reliance on imported milk, (2) low success rate of its core program that is artificial insemination services, (3) the high barriers in accessing government programs, and (4) prevalence of subsistence farming among smallholder carabao farmers.

Heavy reliance on imported milk

The country imports almost 99 percent of the dairy milk consumed in the local market. (See Table 1.) The cheaper price of imported milk in comparison with locally-produced milk is a factor for this reliance, even if the latter is more nutritious (PCC 2022, 35-41). Given the disparity in costs, there is very little incentive for the private sector to invest in local dairy milk production. At the same time, smallholder farmers are discouraged to engage in local milk production because they cannot compete in the local market. Compounding the higher cost of production of local dairy milk is the weak demand due to the lack of consumer awareness on their nutritional benefits (Lantican et al. 2017).

Low success rate of artificial insemination services

The CDP focuses on the use of biotechnology, notably artificial insemination, as the main program for increasing carabao milk production. To facilitate this process, the PCC adopted the strategy of privatizing AI services in 2006. Specifically, the objective then was to get the private sector to support the setting up of frozen semen laboratories and the training of AI technicians. Unfortunately, as late as 2022, AI services had reached only 5.8 percent of the entire population of breedable female carabaos. A large percentage of private AI technicians have remained inactive, adding burdens for farmers who would need access to breeding services for their carabaos, especially during the lactation period (PCC 2017, 2022). In terms of financial requirements,

availing of artificial insemination could cost up to PHP 1,000.00 per carabao. As such, the cost of breeding services that may prove steep to smallholder farmers and limited access to AI technicians would be among the factors for the country's low milk production.

High barriers to joining government feeding programs

A clear benefit of dairy farmers' participation in the CDP is their ability to distribute their milk output among government school-based milk feeding programs, thereby assuring a ready market. Nevertheless, the financial and skills requirements for CDP participants, particularly smallholder farmers, make it difficult for them to gain entry to and benefit from government feeding programs.

1. Financial Requirements

The CDP's feeding programs require financial preparations. Potential participants must get accreditation from the CSO and the NDA-LTO, for which they need to spend at least a total of PHP 1,000.00 for registration and renewal. Moreover, participants need to invest in artificial insemination services that can cost up to PHP 1,000.00 per carabao in order to produce the volume of milk for such feeding programs. Finally, while the Dairy Regulatory System is important to ensure milk safety consumption, it also imposes steep penalties for participants who don't comply with the standards. Farmers who violate any provisions are charged with a penalty fee of PHP 50, 000.00 to PHP 300, 000.00, which in itself could serve as a deterrent for smallholders to join the programs.

Due to these financial requirements, the barriers to access become more difficult for resource-poor farmers who typically earn only PHP 15,000.00 a month. Coupled with the fact that several imported milks are not subjected to the oversight of the Dairy Regulatory System, these barriers discourage landless farmers from meeting the competitive standards of the CDP. As a result, the possibilities for small farmers to be recipients of the CDP is very small.

2. Skill Requirements

To qualify for the CDP feeding programs and as partners of PCC in other economic endeavors requires participants to show a relatively high level of entrepreneurship. For instance, according to the PCC Strategy Map,

entrepreneurship would include being "judicious" in the handling of funds while maintaining a "competent pool of human resources" (Figure 1). Such behaviors are seen to add to the dairy farmers and cooperatives' ability to sustain their participation in the CDP milk feeding programs.

These relatively high financial and skills requirements mean that only a few are able to gain access to a ready market that the CDP school-feeding programs provide. Such incentives nevertheless do not benefit most smallholder farmers, the majority of whom engage in subsistence farming,

Prevalence of subsistence carabao dairy farming

For the CDP to have an impact on the volume of carabao milk produced in the country, it must mobilize the broader population of smallholder carabao milk farmers. The backgrounds of dairy cooperatives and farmers who benefited from CDP programs discussed above suggest, however, that that participation in the program is highly contingent on their already having the skills and resources as starting capital. Given the strong existing portfolio of these cooperatives, they are also more open to take financial risks.

Nevertheless, in contrast, the majority of smallholder farmers are resource-poor and engaged in subsistence production. As such, they are less likely to participate in the program. This has a big impact on the production of carabao milk if we go by a report by the Philippine Information Agency that 99 percent of the carabao population are owned by smallholder farmers (Gavino 2025)

In conclusion, the findings of the study suggest that a key factor in the country's low domestic milk production is the overwhelming dominance of imported dairy milk. Yet, this dominance of imported dairy milk has worked against the strengthening of domestic milk production. Other factors include the limited availability of artificial insemination services to expand the herd population, high financial and skills requirements for dairy farmers and cooperatives to gain entry into the domestic market, notably, government's feeding programs, and the CDP program's failure to address socioeconomic conditions of smallholder farmers, who comprise the majority of the country's dairy farmers.

With the importance that imported milk plays in meeting the local demand, the government is less inclined to put resources into increasing local milk production. In fact, the trend is to rely on privatization to meet the needs of

the industry. One, big multinational and local dairy corporations (MNCs) come in to distribute cheaper imported dairy milk to meet growing domestic demand. At the same time, government, particularly PCC, has turned to privatizing delivery of services, including artificial insemination, in accelerating the carabao population.

Policy Recommendations

The alignment of the CDP's antipoverty thrust with the Animal Industry Development and Competitiveness Act (AIDCA)

The Animal Industry Development and Competitiveness Act (AIDCA) was passed last September 25, 2025 to promote the role of the state in industrializing agricultural development (Title I, Section 2). The AIDCA declared that the state is responsible for advancing the animal industry "through robust regulatory and development institutions, adequate resources for production support especially for small farmers and producers, sound laws and regulations, effective coordination and collaboration with stakeholders, and credible standards and measures for safety and quality of animal products" (Republic Act No. 12308).

To achieve this, Title II of the AIDCA extends the mandate of implementing agencies such as the PCC and the NDA. Specifically, as per Section 7, "biologics research and development" under the PCC shall be further developed to propagate native carabaos and to increase carabao milk production (Republic Act No. 12308). Moreover, AIDCA also promotes stronger inter-agency harmonization. Title II Section 14 stipulates the enhanced coordination among the PCC, the Department of Education (DepEd), the Department of Agriculture (DA), the Department of Social Welfare and Development (DSWD), and Local Government Units (LGUs). Such coordination designates PCC and the NDA as distributors of local milk for anti-poverty projects such as national milk feeding programs (Republic Act No. 12308).

To operationalize these mandates, the AIDCA functions as a "funding mechanism" to boost the herd population, to provide financial support to DA-accredited cooperatives, and to make microfinancing programs more accessible to small farmers (Cordero 2025; Pascual 2025; Republic Act No. 12308). Title III Section 15 provides for the Animal Competitiveness

Enhancement Fund (AnCEF), which amounts to an annual budget of PHP 20 billion. This amount will be sourced from tariffs collected from imported dairy products and livestock poultry (Republic Act No. 12308). In terms of funding allocations, the PCC gets 3.5 percent to boost its genetic improvement program, around 1.67 percent for the development of animal feeds, and one percent for R&D and commercialization programs (Title III, Section 16).

1. Distribution of carabaos and the expansion of breeding services to dairy farmers' cooperatives and associations, including those of agrarian reform beneficiaries (ARB)

AIDCA's Title II Section 14 and Title III Section 15 respectively prioritize strong coordination among government agencies and the AnCEF being earmarked for providing small farmers with financial and market support. With the AIDCA giving "preferential attention" to "livestock raisers who are members of cooperatives, associations, or organizations" (Title II Section 17), the Department of Agrarian Reform (DAR) can be involved in the implementation of the CDP. Specifically, the Agrarian Reform Beneficiaries Organizations (ARBOs) can be included as beneficiaries of the CDP to expand support services for farmers who are granted a Certificate of Land Ownership Award (CLOA).

In turn, the CDP can provide live buffaloes, biotechnological innovations, and breeding services to farmer-members of ARBOs. Since the ARBOs are organized to make technology and production inputs more accessible for small farmers (Ballesteros and Ancheta 2020, 8), the involvement of ARBOs in the CDP can increase the access of the formal economy to the landless farmers. Hence, the CDP can provide alternative sources of income for ARBOs by introducing other value-adding agricultural activities accrued through carabao farming.

2. The Condonation of Farmers' Debts and the Increase of Farmers' Participation in the Agri-Negosyo (ANYO) Loan Program

As per the Department of Agriculture-Agricultural Credit Policy Council (DA-ACPC) (2020), only 33 percent of small farmers have access to formal credit. However, estimated loan demand from Philippine small farmers had soared to PHP 478 billion in 2024 (DA-ACPC 2020). Such a deficit between access and demand has been attributed to the reluctance of banks to lend

money to small farmers (Llanto 2020). The latter are deemed by banks as "not creditworthy" due to their inability to provide collateral and lack of good track record in repaying loans and debts (Llanto 2020, 9).

To address this, Title II Section 12 of AIDCA mandates the PCC and the NDA to write-off all the past debts, interests, and penalties of their farmers. Supplementing this AIDCA provision is the Philippine Carabao Center-Agricultural Credit Policy Council's (PCC-ACPC) Agri-Negosyo (ANYO) Loan Program. As a loan facility that focuses on strengthening carabao-based enterprises, ANYO gives small dairy farmers and cooperatives access to loans of up to P 15 million with an interest rate of 2 percent per annum (DA-ACPC 2025).

3. The Systematic Expansion of Village-Based Artificial Insemination Technicians (VBAITs) through the PCC-DSWD coordination in the Enhanced Partnership Against Hunger and Poverty (EHAHP) Program

A significant issue with the provision of AI services is its inaccessibility in remote areas. To systematically expand dairy farmers' access to VBAITs, the PCC can utilize AIDCA's Title III provisions that state that P 5.2 billion must be distributed to herd build-up programs (AGAP Partylist 2026).

Title II Section 14 mandates the further harmonization of anti-poverty programs between the PCC and DSWD at the LGU level. Recently, the DSWD's Enhanced Partnership Against Hunger and Poverty (EPAHP) Program coordinates with the PCC to distribute milk through its feeding programs for malnourished children in Regions I, VI, and IX (DSWD 2021). By giving milk farmers access to government milk feeding programs, the AIDCA provides market opportunities for small farmers.

Aside from this, AIDCA also can provides VBAIT trainings and seminars for farmers in far-flung regions, further expanding the localization of AI services. The CDP can be aligned with the anti-poverty goals of the EPAHP by designating VBAITs to dairy farmers and cooperatives who are beneficiaries of the national milk feeding program.

4. The Alignment of CDP with the Development of Cheaper Farming Inputs

Currently, biotechnological innovations in the CDP are mostly limited to product innovations and artificial insemination services. On one hand, the PCC often introduces carabao milk-based products such as Nyogurt (yoghurt consisting of coconut milk and carabao milk), Karabun (bread made from carabao milk), and Karapops (candy balls made out of carabao milk). On the other hand, the CDP mostly prioritizes the distribution of artificial insemination services as a cheaper alternative to importing live carabaos.

Despite the significance of product innovation and artificial insemination in boosting local milk production, the paper also recommends that the CDP can utilize the AnCEF to develop cost-effective forage practices and technologies. With the AIDCA, five percent of the AnCEF will be allocated for the "development and propagation of animal and poultry feeds" that are "easy and affordable" to small farmers (Title III, Section 16). Such funds can be utilized to further innovate seed technology, seed conservation, and seed multiplication. These biotechnological innovations can encourage landless farmers to harvest their own feeds without relying on purchasing expensive quality feeds in the market.

Overall, the paper recommends that the ANCEF funding can be utilized to strengthen AIDCA provisions, notably those calling for the following: (1) to distribution of live carabaos to DA-accredited cooperatives farmers-members of the agrarian reform beneficiaries organizations (ARBOs), (2) to write-off condonation of farmers' debts towards the PCC (3) expansion of CDP local technical services on carabao farming, including artificial insemination services, at the LGU level, and, (4) strengthening of local government and universities intervention in developing inclusive and cost-efficient farming inputs. Having fundings that are collected from tariffs can address the barriers to smallholder farmer's participation in the CDP can raise local milk production in the long run.

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University of the Philippines Diliman, Quezon City 1101

Telephone (02) 8981-8500 loc. 4266 to 4268
(02) 8426-0955

Email cids@up.edu.ph
cidspublications@up.edu.ph

Website cids.up.edu.ph