Key messages

• The Amul Dairy model is a three-tier cooperative system where almost 80% of the revenue reaches the farmer members in the form of milk sales and bonuses.1

• Amul modelled its Take-Home Ration production system around the Amul Dairy model and made significant strides in improving quality and eliminating the barriers related to other types of production models.

• Supply chain logistics are digitized through Amul’s mobile application thus allowing for greater transparency and efficiency.

• Despite few implementation challenges, the Amul model has been successful in setting up three factories, catering to 42 million beneficiaries in its first year of operation.

Introduction

Gujarat, one of India’s most industrialized states, entered into a 10-year agreement with Amul, a cooperative dairy society, for centralized production of high-quality Take-Home Ration (THR). This initiative leverages Amul’s industrial expertise to alleviate malnutrition in the state, where 39% children suffer from stunting and 38.2% suffer from anemia.2 The Gujarat model is one of the few models in India that has efficiently incorporated micronutrient fortification production of THR.

Operating Model

Amul Dairy’s three-tier system (Figure 1) is a democratic governance model. Farmers own and control institutional infrastructure and are involved in strategic and operational decision-making, thus resulting in high accountability and ownership of the model. The model is structured into three tiers: village, district, and state levels. At the village level, each farmer contributes by supplying milk to the Village Dairy Cooperative Societies (VDCS). VDCS are federated at the district level under the District Milk Unions (DMU). Milk supplied by VDCS to DMUs is processed into various consumer products. At the state level, State Milk Federation (SMF), the apex organization, spearheads sales and marketing.3 The management committees and the board members of Amul Dairy, and its various tiers, who are all farmers at the DMU level, are elected by other farmers through elections held every three years. This simple and innovative model has ensured that farmers take ownership of their growth through cooperatives, where managers at all levels are accountable to leaders elected by farmers, thus helping India emerge as the largest milk producer in the world.

The desire to emulate the same trajectory for nutritional improvement was the driving factor for the Government of Gujarat to contract Amul for THR production. THR production is an inverted model compared to the dairy model because production occurs centrally before it is distributed to the village level. Nonetheless, the quality control, production process and control design were all modelled after the Amul Dairy model.

THR Production

Gujarat Cooperative Milk Marketing Federation (GCMMF), the cooperative body that manages the Amul brand name, has entered into a tripartite agreement with the Government of Gujarat and the Kaira, Banas and Surat district unions for production and supply of THR products. The three unions have individual installed capacities of 200MT/day.4
THR Products

Amul produces two types of fortified blended food as THR for children and women:

1. **Balbhog**: For normal weight children of 6 months to 3 years and severely underweight children of 6 months to 6 years; 125g per child per day.
2. **Sakhibhog or Devibhog**: For pregnant and lactating women (PLW); 145g per person per day. These are designed as instant mixes for recipes such as sukhdi, sheera and upma.

The common ingredients for both products are wheat, soybean, pulses, sugar and oil. The two formulation differ in their micronutrient composition (Table 1).

The packaging is designed to appeal to the distinct beneficiary categories and avoid intra-household sharing (Figure 2). The illustration on the packaging is mandated by the government but Amul has the flexibility to adapt the style and seal of the packaging.
TABLE 1: Nutritive value per 100g

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Balbhog</th>
<th>Sakhibhog/Devibhog</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy (kcal)</td>
<td>414</td>
<td>482</td>
</tr>
<tr>
<td>Protein (g)</td>
<td>9.3</td>
<td>11.1</td>
</tr>
<tr>
<td>Fat (g)</td>
<td>14.8</td>
<td>23.3</td>
</tr>
<tr>
<td>Carbohydrate (g)</td>
<td>59.7</td>
<td>44.2</td>
</tr>
<tr>
<td>Vitamin B1 (mg)</td>
<td>0.27</td>
<td>0.22</td>
</tr>
<tr>
<td>Vitamin B2</td>
<td>0.12</td>
<td>0.08</td>
</tr>
<tr>
<td>Vitamin B3</td>
<td>1.49</td>
<td>0.89</td>
</tr>
<tr>
<td>Folate (µg)</td>
<td>63.79</td>
<td>84.58</td>
</tr>
<tr>
<td>Beta-carotene (µg)</td>
<td>22</td>
<td>1</td>
</tr>
<tr>
<td>Calcium (mg)</td>
<td>53</td>
<td>107</td>
</tr>
<tr>
<td>Iron (mg)</td>
<td>3.06</td>
<td>4.39</td>
</tr>
</tbody>
</table>

Procurement and Quality Control

Raw material procurement
Raw materials are procured through tenders adhering to the standards and conditions established by the Government of Gujarat. Wheat is issued by Food Corporation of India (FCI). All raw materials are stored at a central warehouse.

Processing
The central warehouse supplies to factories in the three unions. Each factory is equipped with fully automated plants designed as a multi-floor production unit. Raw materials are inputted at the 11th floor and the final product is received on the first floor. The output is packed in sacks of 20 THR packages and sealed in bulk sacks for delivery.

Quality Control
Quality is rigorously checked throughout the production process using advanced technology. Once sample checks are certified by quality control manager, bulk parcels are kept in storage for five to six days before distribution. In some cases, further analysis is conducted through a collection of 18 random samples every month by third-party laboratories as well as by the Government of Gujarat.

Monitoring
Amul developed a mobile application-based system to monitor packages as they are produced, stored and transported through the supply chain. Once the product is ready for distribution, the quantity is logged in Amul’s mobile application, and the Integrated Child Development Services - Common Application Software (ICDS-CAS) system assumes oversight. This is a key lever that improves transparency among all stakeholders in the supply chain and plugs pilferage while ensuring product quality and safety.

Delivery and Distribution
Each Anganwadi Centre (AWC) inputs their monthly THR requirement into the ICDS-CAS. The ICDS then reviews the order, amalgamates them, and approves and submits orders to Amul through the mobile app. Amul
uses the application to monitor the packages as they are produced, stored and transported. Upon arrival at the AWCs, the recipient Anganwadi Worker (AWW) confirms that they received the transported THR products through the application by inputting a one-time password (OTP) provided to him for each transaction through ICDS-CAS.

“The deliveries are very reliable, and I have never faced discrepancies in the THR I ordered and the quantity I received.” — Anganwadi Worker

Consumption

Amul THR products are currently being distributed to ~42 lakh beneficiaries every day. To gauge the reaction of these beneficiaries towards THR provided by Amul, we conducted focus group discussions at three urban AWCs. These AWCs were located in school complexes (Figures 3 & 4) and cater to 600-700 beneficiaries.

In the previous model, ingredients were allocated separately. This led to beneficiaries using the ingredients to make food for the entire family, thus diluting the reach and reducing nutritional benefit to target beneficiaries. However, with the Amul model, sharing between family members has been largely reduced due to specific combination of Balbhog (recipes for children) and Devibhog (recipes for PLW) rations and appropriate packaging of the THR, emphasizing the beneficiary category. Beneficiaries also expressed satisfaction with the quality of the THR and reliability of supply.

Further, AWC supervisor cited improvement in nutrition content of the Amul THR and emphasized the necessity of continuing to educate and encourage beneficiary uptake. The supervisor also corroborated the fact that the THR has mitigated family-sharing dynamics of previous products. Lastly, the supervisor explained that delivery has improved through Amul’s participation in the supply chain. Previously, AWWs were responsible for purchasing the various ingredients, which they had to deliver and store at the AWC themselves. With Amul, the THR packages arrive at the AWC ready for distribution and consumption.

Training on THR Usage and Storage

Amul has created a recipe booklet containing different food items that can be prepared from the THR, but there’s a perceived gap in its dissemination. Some women indicated that they have not received any formal training on THR preparation from the AWCs; rather, they were self-taught in this matter. As such, all beneficiaries explained that they prepared the product by mixing it with hot water or milk, depending on availability. Breastfeeding mothers used the THR as a complementary food to breastmilk. For older children, mothers prepared the THR either as breakfast or a snack upon requests from the child. Regarding dosage, most beneficiaries expressed that they follow the instructions on the packaging. Lastly, storage was typically in their own aluminum containers given that the packages do not come with a zip or storage function.

Amul model versus Old model

Table 2 gives us a quick glimpse of the changes brought in by the Amul model to THR distribution in Gujarat as compared to the old decentralized model.
TABLE 2: Comparison of Amul model with old model of decentralization

<table>
<thead>
<tr>
<th></th>
<th>Decentralized (old model)</th>
<th>Amul (new model)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantity of THR received per</td>
<td>3 kg wheat, 500 ml oil and 1 kg pulses</td>
<td>3.5 kg of THR per child and 2 kg per PLW</td>
</tr>
<tr>
<td>beneficiary</td>
<td>Monthly</td>
<td>Monthly</td>
</tr>
<tr>
<td>Frequency of distribution</td>
<td>No processing; directly raw materials given as THR</td>
<td>Primary processing integrated with micronutrient fortification</td>
</tr>
<tr>
<td>Degree of processing</td>
<td>AWW procure and store in AWCs</td>
<td>Federation procures and stores the materials in central warehouse</td>
</tr>
<tr>
<td>Procurement of raw materials</td>
<td>No packaging, gunny sacks used to pack THR</td>
<td>Packed by fully automatic packing machines in food grade pouches</td>
</tr>
<tr>
<td>Packaging</td>
<td>Bulk sack stored at AWCs and beneficiaries collect their portions in own containers on monthly basis</td>
<td></td>
</tr>
<tr>
<td>Distribution and collection</td>
<td>Varies depending on exposure to human contact</td>
<td>Small packets sufficient for one month consumption are distributed among beneficiaries at AWCs</td>
</tr>
<tr>
<td>Shelf life</td>
<td>High</td>
<td>4 months</td>
</tr>
<tr>
<td>Degree of consumption among</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>family members</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Usage in diet</td>
<td>Main meal</td>
<td>Complementary to main meal</td>
</tr>
<tr>
<td>Nutritive value</td>
<td>Lower</td>
<td>Higher</td>
</tr>
</tbody>
</table>

Challenges and Recommendations

Use of Technology
Amul’s mobile application is highly innovative and pragmatic but it is only integrated with the ICDS system up until the product is ready for distribution, after which the ICDS-CAS assumes oversight. In order to better control leakages, the Amul app can be integrated into the ICDS-CAS to allow for supply oversight at the grassroots level. In addition, a barcoding system can be implemented by Amul to seal leakage possibilities.

Implementation Issues
Amul explained that basic food storage requirements were suggested to AWWs, including keeping the THR off the ground and away from walls to avoid water damage. However, implementation of these recommendations was not observed. Continual training on government provided smart phones, periodic messaging, and spot checks from Amul at the AWCs is an essential consideration moving forward.

Beneficiary Retrieval
THR distribution is announced to AWCs through the ICDS SMS that provides a three-week window for delivery. Thus, AWWs and members are unaware of an exact day of delivery or a routine schedule for distribution to beneficiaries. To that end, AWWs have to physically walk around and visit the beneficiaries in the neighborhoods under their jurisdictions on the day that THR are delivered. While this system is not troublesome for AWCs located in urban areas, it can be a significant burden for both AWWs and beneficiaries in rural areas. This system can be improved by building a more reliable routine for distribution to ensure maximum uptake.
Despite the challenges, the Amul model has been successful in setting up three factories in north, south and central Gujarat to cater to 42 million beneficiaries within a year. There are key learnings from the Amul model that can be replicated by other states, interested in streamlining THR production and making the whole program more effective.

• With pilots in five districts Amul gained a comprehensive understanding and proficiency on distribution, accounting, quality control, and government coordination for THR production. Lessons learned from pilot:
  • Designing a quality product and recipe, through rapid testing
  • Producing in large quantities; skilled workers were recruited from other Amul factories and/or related fields, which provided insights on production procedures and quality testing
  • Integrating quality standards of Amul and FCI
  • Distributing from a centralized production unit to decentralized recipients
  • Mitigating software issues within the mobile application, particularly with connectivity issues in rural areas. The software was adapted to allow users to input data into the app while offline and then automatically synchronize once the phone connects to a network
  • Amul’s in-house mobile application, which is tailored to the Amul supply chain but in accordance with the federal ICDS-CAS system, is a key element in its success and an important consideration for replicability. This has mitigated leakages and quality control issues, while avoiding a duplication of efforts or overburdening AWWs.
  • Amul cited the commitment of the Government of Gujarat as an indispensable component of its success. The seriousness with which government officials were committed to the Amul THR system was witnessed down to the AWC supervisor level. Thus, strong state-level commitment is essential to the success of any THR program.

What can other states learn from the Amul model?

Training and Education
Beneficiaries reported that they received no training on preparing, storing and serving the Amul THR. As such, ICDS officials can work in coordination with Amul to design and implement training, potentially through the Amul Review Board’s collaboration. Further, given complications with beneficiary uptake of the THR, educational workshops can be carried out at the AWC level to inform beneficiaries of superior nutritional gains and benefits.

Way Forward
In light of the Supreme Court order in 2012 that emphasized on quality and safety standards during THR production and role of automated machines in it, the replicability of the Amul model is high. Given that Amul’s governance is built on a cooperative model, it is not oriented towards profit maximization and adheres to quality standards. Moreover, there are standards and successes from the Amul model that should be considered across other states of India depending on their particular needs, strengths, and state government policies.
References


