

# The future of small scale dairying

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The value of milk and dairy products as part of the human diet is well documented. Milk is a highly nutritious natural food of particular benefit for growing infants and lactating mothers. Milk contains valuable minerals, vitamins, protein and fat which are the building blocks for healthy growth and development. Recognition of the value of milk is reflected in the increasing interest in development programmes focused on small scale dairying in developing countries where malnutrition and poverty are the main challenge. Market oriented small scale dairying has the potential to increase household income, reduce losses and generate employment in processing and marketing. Potentially, therefore, small-scale dairying is a viable tool to spur economic growth and alleviate poverty. Interventions in small scale dairying need to be relevant to the informal market given that the informal market is and will continue to be important in the foreseeable future. However, the growing demands of milk markets for quality and food safety need to be taken into account when designing interventions. This paper examines the types and importance of small scale milk producers in developing countries, shows projected market demands and indicates the complexities of the multiple dairy market chains. It examines interventions and approaches to successful dairy development and identifies issues for consideration in designing small scale dairy development. A Market Oriented Dairy Enterprise (MODE) approach is suggested as a possible pathway to improving the income of small scale dairy producers using a graduated risk based approach.

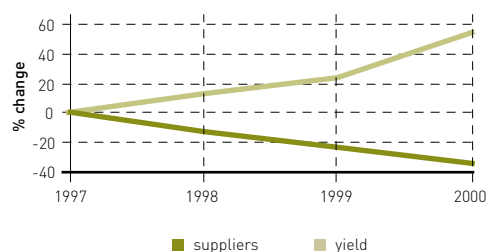
## Small-scale milk producers

Demand for milk in developing countries is expected to increase by 25 percent by 2025 (Delgado *et al*, 1999), partly due to population growth but also because disposable income is being spent on a greater diversity of food products to meet nutritional needs. Small scale producers generate the vast majority of this milk. They include smallholder farmers, who practice a mixture of commercial and subsistence production, provide the majority of labour from within the family, and produce a variety of crops and livestock products to spread the risk of failure, as well as pastoralists who depend mainly on livestock.

Milk production systems vary hugely across agro-ecological zones but are usually dependent on the availability of range or pasture land (for grazing and fodder production), the dairy animals to produce the milk and the water needed to maintain the animals. Feed forms the largest input to most milk production systems while support services such as animal health, AI, etc., are essential to ensure productivity can be achieved and maintained.

Trends in developed nations show intensification of milk production in order to reap the benefits of economies of scale. The same is true of some emerging economies, such as Brazil, where the number of small scale producers has decreased as national production has increased, whereas in many developing countries with a

## INTENSIFICATION OF DAIRY MARKETS IN BRAZIL



Source: Dries (2004)

potential for dairy development, milk production remains small-scale, scattered and poorly integrated into the market chain.

### Milk markets and market chains

One of the unique aspects of the dairy sector in many developing countries is the informal<sup>1</sup> nature of the milk market. It is estimated that over 80 percent of milk consumed in developing countries, an estimated 200 billion litres annually is handled by informal market traders, with inadequate regulation (FAO, 2004a). Substantial work has been done on characterising dairy supply chains but local markets have largely been ignored. Increasing urbanisation means expanding markets for producers particularly in developing countries and countries in transition where the highest rates of urbanisation are predicted. Additional analysis of informal milk value chains is required to assess what is driving the changes that are occurring, whether they are expanding or shrinking, and how to improve market access for small scale producers to the emerging peri-urban markets.

Although direct sale to the consumer is the most common route, recent studies have shown that up to five transactions may take place in the formal dairy chain between the producer and the consumer (FAO, 2004b). Each transaction carries its own cost which is reflected in the price paid by the consumer. Farm gate prices for raw milk vary widely e.g., from US\$0.10 during wet season in rural Guinea-Conakry in West Africa to US\$0.36 in Ghana.

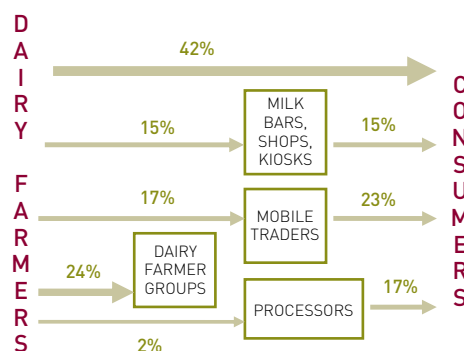
Milk processing can play a major role in improving milk and dairy product safety, mainly through a variety of heat treatment processes. An emerging trend in formal markets is the adoption of approaches to improve the safety of milk and dairy products as consumers become more aware of

### INFORMAL AND FORMAL MARKETS SUPPLIED BY SMALL SCALE PRODUCERS

	Informal	Co-operatives	Source of information
Tanzania	98%	4%	MAC/SUA/ILRI
Uganda	90%		MAIF/ILRI
Nicaragua	86%	4%	CIAT
India	83%	6%	Dairy India
Costa Rica	44%	54%	CIAT
Sri Lanka	40%	7%	MLD&EI

Source: FAO (2005)

### DAIRY MARKET CHAINS IN KENYA IN 2004



Source: MoFLD/KARI/ILRI SDP Policy Briefs (2004)

health risks. There is also a growing awareness and acceptance in formal markets of farm to table approaches such as the Codex Alimentarius approved Hazard Analysis Critical Control Point (HACCP) system.

In particular, large retailers and larger dairy industry concerns are promoting a host of other Good Manufacturing Practices or Good Agricultural Practices which are increasingly raising the standards but not necessarily to the advantage of small scale milk producers. "The failure of many African produced food products to meet international food-safety and quality standards hampers the continent's efforts to increase agricultural

<sup>1</sup> Informal is normally interpreted as an unlicensed or unregulated activity (FAO 2003)

trade both intra-regionally and internationally, locking many farmers out of a chance to improve their economic well-being. Establishing pan-African food safety standards will not only save lives and improve the health of African people, it will go a long way towards helping Africa join in international trade and raise African living standards, particularly in rural areas where most of the poor are subsisting" (DeHaen, 2005).

Dairy imports to developing countries have increased in value by 43 percent between 1998 and 2001. Demand for dairy products in developing countries is expected to continue rising (Delgado *et al.*, 1999). Consequently, through mobilising the small-scale dairy sector to increase production, benefits such as increased incomes and food security can be received by small scale producers. However, the possibility that dairy imports may reach 38 900 tonnes of milk equivalent by 2030 severely challenges the potential success of the local dairy sector in developing countries (FAO/IDF, 2004).

Recently, formal chains have been affected by foreign direct investment, typically controlled by large retailers such as international or national supermarkets and fast food companies (FAO, 2005), and by the growth of dairy processors that have increased the diversity of products on the market.

Significant increases in demand are reported for local or regionally specific products which may be considered as niche products. The National Dairy Development Board (NDDB) of India recently reported an increase of their production in response to market demand for indigenous fermented milk products from 26 623 MT in 1999/2000 to 65 118 MT in 2003/4 and of paneer<sup>2</sup> from 2 008 MT in 1999/2000 to 4 496 MT in 2003/4. (NDDB, 2004/5) This shows not only the capac-

ity of the Indian dairy industry to expand to meet consumer demand but also the growing appreciation of processed products by mid to high income groups who have the purchasing power to afford these products.

Market pull and push factors such as pricing and payment practices can also have an effect on milk availability. The distance between source and sales areas, or the density and scale of the production system, even without product processing can also increase the number of intermediaries, due to the need for assembling, bulking, transporting and distributing. The number of intermediaries involved will have a bearing on both producer and consumer milk prices. The shorter the channel the more likely that the consumer prices will be low and the producer will get a higher return, although it also depends on the way that the chain is organised and whether it is subsidised. The cost of packaging represents an excessively high proportion (up to 30% in some cases) of the liquid milk retail price in many developing countries.

In response to these changes and opportunities there is a need for a more market-oriented risk based approach to dairy development which firmly positions the smallholder farmer/group as the client beneficiary with decision making powers.

### Benefits of small scale dairy farming

As a nutritious food and a source of regular income, milk plays a key role in the household food security in many developing nations. In small scale dairying, milk is available for the family needs first and surplus milk is marketed. One of the most important, but often ignored, direct benefits of small-scale milk production is the immediate nutritional benefit provided to growing children (Calcium and Vitamin A for example) which greatly contributes to a balanced and nutritious diet.

Good nutrition is also a major factor in the ability to fight disease and resist infections. There is growing recognition for the nutritional value of milk and dairy products in communities where

<sup>2</sup> Paneer: defined as "a heat-acid coagulated dairy product" <http://www.indianmilkproducts.com/aboutthebook/technology.htm#b>



School children buying yoghurt at the dairy plant

there is a high prevalence of immuno deficient (HIV/AIDS) diseases and in aged populations e.g. fighting osteoporosis.

Women in developing countries play a key role in dairy animal husbandry. Decisions on the amount of milk to be marketed are often determined by the woman of the household and it is normally the woman who controls and decides how the milk money is used at the household level. Frequently quoted priorities include food for the family, school fees and basic healthcare.

Lack of regular income is one dominant cause of poverty. Crop farming and meat production both not only require investment but only yield periodic returns. Dairying, even on a very small scale, can provide modest but regular returns. This not only directly benefits the family but fosters an appreciation and gradual adoption of saving and loans approaches.

Small scale dairying can also be successfully carried out with a limited land base provided access to water, fodder and basic animal health services are available. The growth of milk production in Bangladesh is a good example where even with minimal land resources available, landless

#### NO. OF OFF FARM JOBS CREATED FOR EVERY 100 LITRES OF MILK COLLECTED PROCESSED AND MARKETING

Country	Direct jobs	Indirect jobs	Total jobs
Bangladesh	7.1	7.3	14.4
Ghana	13.7	3.5	17.2
Kenya	3.0	0.7	3.7

Source: adapted from FAO/ILRI (2004)

smallholders can sustainably produce milk (FAO 2001).

Off farm employment represents a significant benefit of small scale dairying, particularly where small scale processing also practised. From four to seventeen jobs can be created and sustained in small scale dairying for every 100 litres of milk collected, processed and marketed. In Bangladesh most of the indirect jobs are in high value products such as milk sweets. There are relatively fewer jobs per 100 litres in Kenya as milk is normally consumed fresh and the highest figures for Ghana perhaps reflect the low supply, high demand situation with retail jobs accounting for much of the employment.

Milk is a highly nutritious food, but it is also an excellent growth medium for bacteria. Raw milk has the potential to transfer zoonotic diseases and milk-handling procedures must minimise associated health risks. Safety and quality assurance programmes for milk and dairy products must cover the whole dairy chain from farm to table. Processing and proper handling are the most critical steps to ensure safety of products and can be effectively implemented through a tailored quality based milk payment system.

When considering the broader benefits of dairying, it is clear that successful small scale dairy production, processing and marketing can be a powerful tool for sustainable rural economic development. This is particularly so when generation and sustaining off farm dairy related employment is considered

PHOTO: F. LHOSTE, GUINEA, 2003



Women selling milk on the local market

### Constraints

Specific constraints which limit entry into small scale dairying include:

- Capital investment - the cost of a dairy animal, feed and equipment. This outlay can however be reduced by starting dairying with goats or sheep instead of dairy cows or buffaloes or by using indigenous animals initially. Although their output will be smaller, it represents a lower risk.
- Water and power availability - water is needed not only for the dairy animals to drink but also for the hygienic value added through processing which often makes small scale dairying attractive.
- Knowledge of animal husbandry, particularly nutrition. For a smallholder farmer keeping dairy animals, animal feeding typically makes up 60 -70 per cent of the cost of milk production.
- Access to support services such as feed supply, animal health extension and AI.
- Access to adapted and known production and processing technologies - recent technological developments include low cost packaging and pasteurisation systems which are in high demand in developing dairy nations.

Clearly there are instances when the cost of milk production and the level of required basic infra-

structure render dairy production uncompetitive. The measure of competitiveness should also consider strong influencing factors such as local market preferences (e.g., for local fresh milk). Farmers are often not aware of what is needed by the market and have neither the time nor capacity to research market demand. Middlemen or intermediaries are often maligned for their role and considered as an unnecessary element in dairy supply chains. In the dominant informal chains however they play a key role in linking the producer to the consumer. Intermediaries frequently provide credit and savings for the farmer although there are concerns about the cost of the services provided.

Farmer groups may be the best mechanism to improve bargaining power and inform farmers of market needs and demands. The increasing use of modern Information Communication Technology (ICT) is playing a major role in improving instant and periodic market information provision e.g., using SMS messaging, mobile phones and local and national radio stations.

Physical infrastructure such as poor road access and lack of a reliable electrical supply also limits market access. A major constraint to establishing or expansion of a dairy enterprise is the lack of means of milk preservation. Fresh milk is highly perishable with a shelf life of around three hours at tropical temperatures after which it acidifies or sours. Poor seasonal access to rural farms results in huge milk losses for small scale producers who do not have the means to invest in cooling equipment.

Losses along the milk value chain can also be high, resulting from spillage and spoilage due to lack of adequate refrigeration. FAO currently promotes the Lactoperoxidase System (LPS) of raw milk preservation, a safe and natural method that can be used in situations where no cooling facility is available or affordable. It is intended for use by trained people at the level of collection points, not by individual farmers (FAO, 1999) but does not replace pasteurisation (FAO/WHO, 1991).

## Approaches and lessons learnt

Working directly with farmers is the most direct means of influencing their decisions and raising their awareness of market opportunities. It is however prohibitively resource intensive and therefore not practicable for public or private partners. An assessment of successful small scale interventions across the five continents by FAO over the last 40 years indicates that the best choice is farmer groups or organisations as an entry point.

Working with groups substantially reduces costs and empowers communities to sustainably manage their own affairs. Small scale dairying is often most successful when it initially addresses local demands, either through accessing existing markets with competitive products or opening up new product streams for consumers.

Milk processing offers further benefits in terms of return and markets for small scale dairying. Returns from processed products are significantly higher than for raw milk and result in significant off farm rural employment in milk collection, transportation, processing and marketing. Additional benefits include improved safety, lowered risk of zoonoses transmission and longer product shelf life.

Strong institutional support is critical to the success of national dairy development initiatives. There is a need to promote milk and dairy product consumption and to facilitate the full participation of smallholders in dairy development. Given the increasing devolution of government towards a purely regulatory role, this leaves a major institutional gap in supporting small scale dairying from the provision of support services, input suppliers, payment systems design through to quality standards and practices. This institutional gap also highlights the need for a change towards a market responsive approach, active capacity building and adaptive technology development and innovation.

Poor governance and weak institutions have been the stumbling block for many dairy enter-

prises. Milk collection, processing and marketing organisations are attractive 'cash rich' enterprises and therefore at high risk of 'leakage' or misappropriation of funds to the detriment of the shareholder producers. Guidance on milk group formation, operation and activities has been documented by FAO [2002].

An enabling policy and regulatory environment allows market forces to react effectively to market demand. The example of Milk Vita from Bangladesh details the key steps and factors in the success of the transformation of a former parastatal to one of the most successful dairy enterprises in Bangladesh today.

Dairy boards are widely promoted as a suitable institutional framework within which small scale dairy development can take place. Perhaps the best known case is that of India which, through a commodity monetization programme under Operation Flood, has grown to become the second largest milk producer in the world. This was due not only to the massive investments in commodities but also to the management and organisation skills of the National Dairy Development Board of India. It is however important that national institutions are representative of smallholders who form the majority of dairy producers in most developing countries. This can only be achieved when there is, in parallel, development of local producer, collector and marketing institutions.

From the above evidence, it can be seen that a successful intervention in the smallholder sector has to be focused on milk or producer groups as an entry point. An appropriate approach should be risk based, graduated and move progressively to a market oriented dairy enterprise based on group members being empowered to make well informed decisions. A Market Oriented Dairy Enterprise (MODE) approach is suggested as a guide for successful small scale dairy development. The approach is characterised by a step-wise movement towards being a successful dairy enterprise. Essentially three key steps are recognised in the approach:

## MILK VITA IN BANGLADESH

*From the mid 1970's to the late 1980's FAO, UNDP and DANIDA provided technical and financial assistance through the Government of Bangladesh to establish a sustainable co-operative dairy development programme. From a modest start, providing 4,300 very poor, often landless, households in remote rural areas with a complete package of milk production enhancing technologies, village level organisational skills and a milk collection-processing-marketing system, the two-tier Milk Vita Co-operative has grown into a successful commercial dairy enterprise. Today, milk is collected from 40,000 farmer-members organised into 390 primary village co-operatives, then processed and distributed to all the major cities in the country. In 1998, producers delivered 30 million litres of milk surplus to their household requirements and received a total of Taka 467.4 million (US\$ 9.3 million). Since start-up, average milk deliveries per member have quadrupled to 2.1 litres a day, while regular earnings from milk have increased ten-fold in real terms to Taka 32.5 a day (65 US cents). This has helped to lift average earnings above the poverty line and to sustainably improve rural livelihoods. The resultant increase in milking cow numbers and savings generated also serves as a cushion against the devastating effects of severe flooding that regularly afflict the country.*

*Democratically elected milk producer and distributor co-operative members are now in the majority on the Milk Vita Board of Directors. This encouraged the Government to withdraw from day-to-day management enabling the Board to hire professional managers. This, in turn, improved performance and created a platform for further expansion to bring more poor people in to the remunerative milk collection network. In the 1998/99 financial year Milk Vita made a profit of Taka 40.2 million (US\$ 0.8 million) on a turnover of Taka 782.0 million (US\$ 15.6 million). Much of the profit was distributed as a dividend to milk producers and reinvested in an expansion programme.*

*Milk Vita continues to be a flourishing concern, which can be seen not only from its encouraging financial performance and plans for growth, but also from its recent imitators who have set up similar dairy enterprises to process and market 50 million litres of milk annually. The Grameen Bank is currently adapting the model to reach out to some 8,000 of its poorest female clients involved in inland fish farming, again with UNDP and FAO technical assistance.*

Step 1: Groups are set up and operational

Step 2: A low level of activities are recorded with limited returns

Step 3: A market oriented approach is adopted and a successful enterprise put in place

At **Step 1**, there is increasing collective activity, e.g. contact with input suppliers such as bulk purchase of feeds, and a clear increase in incomes for the group. Measurement of continuous successful activity (even at this low level in terms of volume or for low profit level) can indicate that the group can move on to the next level. The group or

individual will decide when and how to make the move to take the next step.

At **Step 2**, following a period of time and with their expanded perspectives and understanding of market opportunities and acceptance of a low risk level of activity, the group may decide to build up their capacity to expand. This is a key limiting factor in current group development and represents the most significant step in the MODE approach.

At **Step 3**, groups become organised as an enterprise entity or group, expand and consolidate their activities and should also be able to

## MODE - A RISK BASED APPROACH TO STEPPED MARKET ORIENTED SMALL SCALE DAIRYING

### STEP 1

Milk maps  
Transaction recording  
Loss reduction  
Basic market research  
Group formation and enterprise organisation  
Improved feed and fodder  
Sanitation and maintenance

### STEP 2

Development of enterprise business plan  
Enterprise accounting and reporting  
Exposure to applicable technologies  
Milk and dairy product quality assessment  
Loss reduction  
Group strengthening  
Basic negotiation skills (individual to individual)  
Sanitation and maintenance  
Market research and transaction costs

### STEP 3

Group auditing  
Preparation of enterprise and investment plans  
Application of suitable technologies  
Market monitoring and analysis  
Group strengthening  
Advanced negotiation skills (contracts/agreements)  
Sanitation and maintenance  
Adding value to optimise profit  
Milk and dairy product quality monitoring  
Loss reduction  
Processing and transaction costs



show that they have regular dairy based activities generating a profit which provides regular incomes to their members. The entity (Self-Help Group, co-operative, company etc.) can then be considered to be a success.

The MODE process is characterised by progressions of (a) institutional arrangements and (b) enterprise and market orientations. The institutional arrangements progression is evidenced by: groups or individuals with dairy animals and dairy activities (i.e., excess milk available); holding regular meetings; initiating group activities of common interest; building group trust; refining group activities; having elected officers; agreement on a constitution; relations with other groups; and participation in stakeholder fora.

The enterprise and market orientation progression is evidenced by: activities generating a benefit; activities generating a profit (cash); market awareness; increased availability of market infor-

mation; market research; market analysis and identifying and quantifying opportunities; testing products on the market and consumer preferences; analysing feedback and preparing a market entry strategy; limited investments for products or marketing; launching of products on the market; regular streams of income recorded and reported; volume of production/sales increasing with market demand; increasing profitability; and linkages with other enterprises.

## Issues

**Market access.** Local markets for milk and dairy products are often overlooked while milk export potential is overemphasised. Milk marketing should therefore be more oriented to local market potential, identified through the design, implementation and proper market research and analysis to quantify market supply and demand. Rural market infrastructure can be improved not only by



central government but also by local communities through innovative partnerships including those with the private sector.

Small scale milk producer and processing **groups** can be excluded from larger formal supply chains due to rapid introduction of high standards or technical specifications without any price incentives. In addition group members may not be willing or able to absorb the prolonged credit periods demanded by large wholesalers or retailers.

Shortcomings in the organisation of milk collection, processing and marketing systems have seriously undermined the potential of smallholder dairy producers to exploit urban markets in many developing countries. Strong institutions are needed to support the development of these systems.

**Capacity building** on contract negotiation skills is required in addition to a clear division of time-table for the movement of a milk producers group from a socially oriented grouping to an enterprise driven entity.

Upgrading of technical and organisational skills to accelerate developments in the area of **producer organisations**, at local, regional and national or federal levels is needed. The role of government is to create an enabling environment through a legal and regulatory framework and training to promote a democratic approach to group formation and operation.

**Governance.** Empowerment of farmers groups is a sensitive and often painstaking process which requires substantial investment. Farmers are naturally risk adverse but understand risk management and are alert to alternative sustainable income generation opportunities. Milk is therefore a powerful 'pull' factor for many farmers groups and organisations as they rapidly receive returns on their investments.

There is a growing **awareness** of changing roles of public stakeholders towards privatisation and the need for institutional reform. The dairy sector is often at the forefront in this tendency with local regional and national institutions being privatised

including the provision of research, technical support and extension services. The growing importance and positioning of the powerful global dairy industry also influences the role which can be played by the small scale dairy sector.

A facilitative and conducive **policy environment** is required for sustainable dairy development. Dairy policy must be linked to the national livestock development policy and implemented through detailed strategies. The strategies must be participatory, combine public and private sector interests and delivered through relevant stakeholder institutions.

**Barriers.** The increasing importance of regional standards and trade provides both opportunities and challenges. In recent years there has been a strong drive for regionalisation of trade policies and regulations governing the movement and trading of goods. This presents an opportunity for groups or enterprises that can meet the standards but also a challenge to those who determine such standards to ensure they are inclusive and not exclusive of their smallholder producers.

Small scale dairying may not appear competitive based on production costs but can be competitive in a market due to consumer preferences e.g., fresh locally produced milk can command a premium over imported products. This represents a major opportunity for small scale dairy groups, provided they can be effective in marketing and producing 'quality' products.

## Conclusions

In countries where intensification of the dairy sector is proceeding very quickly (this would apply to a number of Latin American countries), the very small scale producers will decrease in number. In much of Asia and Africa, however, there is still a potential for small scale dairying to be an important contribution to rural development and a means of improving smallholder livelihoods. A market oriented approach however will require a fundamental change of thinking by both the public and private sectors.

A revised focus is needed to facilitate the 'pull' factors in market led dairy development rather than the traditional production inputs emphasis. This will require investment in building local, national and regional capacities in dairying, ranging from marketing through to safe milk production.

Farmers groups are the key to success for small scale dairying. Empowering producers is essential to make an effective impact on sustainable rural development in areas where dairying can be competitive. Competitiveness should not be only measured on production cost alone but also by market demand/elasticity, particularly for local products, tailored to local tastes. Dairy processing provides significant benefits in terms of employment and value addition and warrants inclusion in small scale dairy interventions.

To reach farmers groups a risk-based, stepped approach, such as MODE is considered as an appropriate means to ensure that small scale dairying can improve livelihoods and contribute the local and national economy. The application of the approach requires tailoring for each national situation – an area in which FAO and its development partners are active

Dairy enterprise groups need also the autonomy to select the form of organisation or institution which ensures good governance, accountability and best suits their needs.

Further study and analysis of informal smallholder dairy sector chains is needed to design appropriate interventions and understand the dynamics and forces which are predicted to shape smallholder dairy development. FAO is planning to develop and source funding for some of this work.

Finally there is no magic solution to successful small scale dairying. A market oriented and integrated approach addressing a variety of constraints as outlined above can be effective but tailored solutions are required in many countries due to market preferences and quality requirements. A participatory risk based approach such as the MODE may offer the best way forward.

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