MILLIMAN RESEARCH REPORT

Mortality of dairy cows in Georgia

From guesswork to data through farmer surveys

Managing Risks for Rural Development: Promoting Microinsurance Innovations

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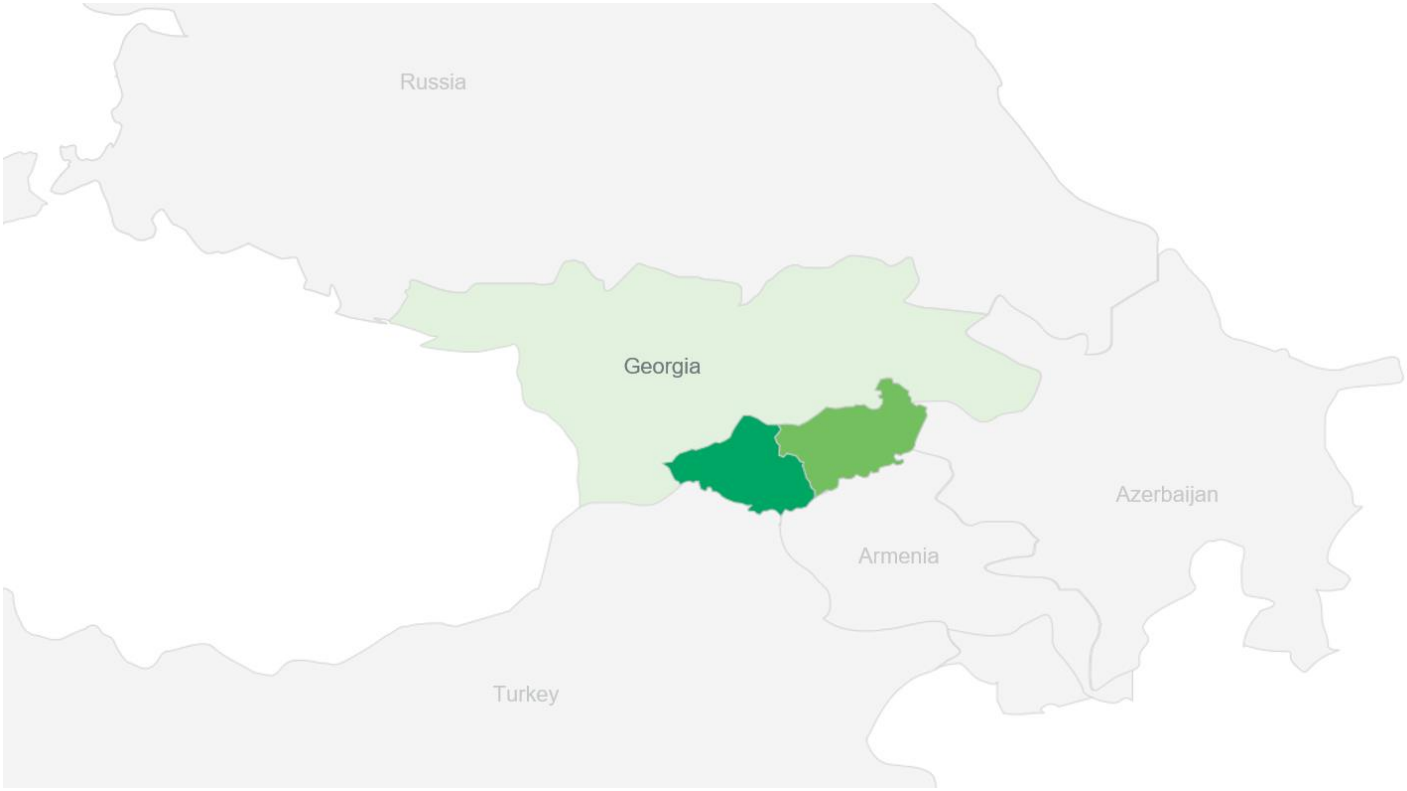

MicroInsurance Centre at Milliman

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Abbreviations

GEL	Georgian Lari
GFA	Georgian Farmers Association
IFAD	International Fund for Agricultural Development
MIC@M	MicroInsurance Centre at Milliman
MRRD	Managing Risks for Rural Development
NGO	Non-Governmental Organisation
USD	United States Dollar

Executive summary

How often do milking cows die and from what causes? This is one of the first questions that needs to be answered when developing livestock insurance. In order to address a lack of data on milking cow mortality in the Republic of Georgia and support the design of valuable insurance and risk management for smallholder dairy farmers, the MicroInsurance Centre at Milliman (MIC@M), in the context of its Managing Risks for Rural Development (MRRD) project, organized a study on farm characteristics, practices, and mortality experience among smallholder dairy farmers. The MRRD project team designed a structured questionnaire, and in late 2019 the Georgian Farmers Association conducted 501 phone interviews with farmers in the Samtskhe-Javakheti and Kvemo Kartli regions. To the best of the authors' knowledge, this is the first quantitative survey on cow mortality in Georgia for at least a decade.

Key findings from the survey, which encompassed a milking cow (hereafter, "cow") population of 4,604 animals, include:

- **Farm characteristics**. Farm size varies widely, but the median farmer has six milking cows (average nine). Half of all cows are younger than six years, with the vast majority of cows under 10 years.
- **Farm practices**. Just over half of all farmers invest in a herdsman during the summer months, costing them up to GEL 20 (US$7) per cow per month. Farmers are much more likely to purchase additional feed during the winter months (than in the summer months), but almost 40% of farmers never offer their cows more than hay. The use of vaccinations beyond the government-mandated program is unclear, but almost half of farmers gave either preventative or treatment care related to Piroplasmosis, a tick-borne disease.
- **Sale and purchase of milking cows.** Farmers are three times more likely to sell cows than buying new ones, which is rooted in the practice of raising and keeping their own calves, while selling older, less productive animals for slaughter. The primary reason farmers sold cows was a need for cash, but 43% of sales corresponded to a decrease in the value of the cow, due to such conditions as sickness, old age, or low productivity. Increasing milk production was the primary motivation for new cow purchases, and the majority of prices reported ranged from GEL 1,500 – 2,500 (US$ 520–865).
- **Milking cow mortality**. Overall, cow mortality during the last three years stood at 1.6%, with farmers with the smallest herd sizes experiencing slightly higher rates. The single most common cause of death is disease (47%).

These findings have implications for livestock insurance product design in terms of, among other things, risks covered, cover value, eligibility criteria, and risk rates. The causes of death suggest that livestock insurance for Georgian smallholders needs to include a cover for diseases because otherwise the product would not be attractive enough to farmers. With pure mortality at 1.6%, cow mortality appears lower than what some insurers suggested. Even if the sales of sick animals and those who suffered an accident are included, the rate remains below what many proposed is happening on the farms.

Taken together, these elements should allow interested insurance companies to take a new approach to insuring the 500,000 dairy cows owned by Georgian smallholders. Some bold steps are still required, but the data presented in this report can help to better assess the risks involved and manage them appropriately, while offering an attractive protection to the country's smallholder farming community.

Background and rationale

How often do cows die and from what causes? As it does to so many microinsurance programs globally, an absence of reliable data plagued the MicroInsurance Centre at Milliman's (MIC@M) efforts to develop valuable livestock insurance for smallholder dairy farmers in the Republic of Georgia. As part of its International Fund for Agricultural Development (IFAD) grant-funded project, Managing Risks for Rural Development: Promoting Microinsurance Innovations (MRRD, see below), the MIC@M has been working with dairy farmers, insurers, non-governmental organizations (NGOs), cheese manufacturers, and other stakeholders to develop solutions for farmers to better manage their risks and secure their investments in and livelihoods from dairy farming. In the absence of readily available and reliable data, including statistics on dairy cow mortality – a key risk for dairy farmers – the MIC@M's MRRD project team set out to find some answers.

With support from the Alliances Caucasus Programme (ALCP)[1] and local organization Association Rural Development for Future Georgia (RDFG), the research team gathered information through more than 30 focus group discussions with farmers, individual interviews with veterinarians, and other stakeholders in the dairy value chain as well as key government officials. Responses varied significantly, but all agreed on one point: the implementation of the mandatory vaccination campaign for all cattle across the country has helped to bring down cow mortality. However, the central question remained: **what is the current mortality rate among Georgian dairy cows?**[2] The MRRD project team concluded that gathering data on farmers' actual experiences with cow deaths directly from the target market would be a valuable way to give insurers confidence to offer comprehensive livestock mortality insurance at fair and feasible rates.

In order to answer this crucial question, the MRRD project team designed a short questionnaire, which was used to conduct phone interviews with individual farmers. While the question regarding cow mortality motivated this research, the survey also offered an opportunity to gather additional information about farm characteristics, herding and feeding practices, as well as the reasons for buying or selling milking cows. While the primary purpose of this study was to inform the MIC@M's work with MRRD on livestock insurance product development, it was also intended to provide data and learnings for the Georgian insurance industry and other related stakeholders, so that they can develop better products, services, and programs to support the dairy sector. This report provides the results of the survey and highlights some key implications for the design of valuable livestock insurance for Georgian smallholder dairy farmers.

Managing Risks for Rural Development: Promoting Microinsurance Innovations project

MRRD is a four-year grant project implemented by the MicroInsurance Centre at Milliman and funded by IFAD, with the goal to increase resilience, strengthen capacity to manage risks, and improve the livelihoods of poor rural households who depend on off-farm and on-farm income in China, Ethiopia, and Georgia. This is done by developing innovative microinsurance solutions in each country, which seek to include additional, non-insurance components so that clients benefit from a comprehensive risk management package. Where possible, MRRD activities are linked with the IFAD-financed project portfolio to leverage existing development efforts in each country.

[1] The Alliances Caucuses Programme is a Swiss Agency for Development project in cooperation with the Austrian Development Cooperation implemented by Mercy Corps Georgia.

[2] Going forward, the term "cow" will be used instead of "dairy cow" or "milking cow". In the Georgian smallholder context, cows usually start giving milk at age 3, with some starting to give milk at age 2.

Methodology

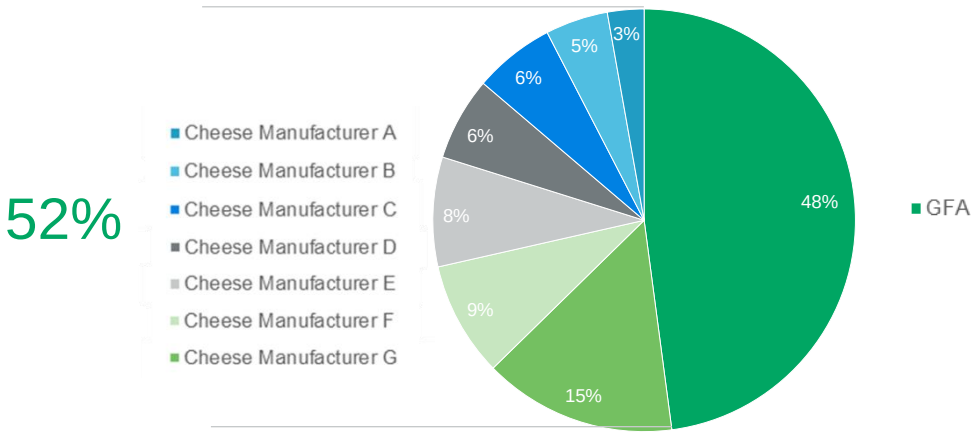
The MRRD project team developed a structured questionnaire (see Appendix 1) with the goal of answering key questions on cow mortality and causes of death as well as questions on farming practices, while keeping the duration of each interview below 10 minutes. The Georgian Farmers Association (GFA) was contracted to conduct the survey, and staff conducted phone interviews from October 28, 2019, to November 29, 2019, in Georgian and Russian. Google Forms was used to input responses in real time and allowed all involved to follow progress and look at the collected data throughout the process.

A sample size of 500 farmers was deemed appropriate in order to capture sufficient numbers of cow deaths to determine mortality rates with confidence. A total of 501 interviews were completed. In order to increase the likelihood of having sufficient observations of cow deaths, respondents were asked to report any cow death within the last three years. Important events such as a cow death should be easy to remember within this time horizon, while there is no indication that external factors and farming circumstances have changed dramatically since 2017.

Smallholder dairy farmer contact details were obtained from cheese-manufacturing companies in the pilot regions[3] and complemented with GFA's own database. Working towards the goal of 500 completed interviews, priority was always given to contacts provided by cheese manufacturers because the MRRD project works in close collaboration with them for offering new services, including insurance, to their supplying farmers. In the end, 52% of all responses came from farmers whose contact details were provided by cheese manufacturers (see Figure 1). As most of the cheese manufacturers were in the process of building up their database of farmers supplying milk to them, contact details were not available for everyone. Thus, the number of contact details per dairy processor in the sample is not necessarily indicative of the number of farmers they work with, but rather of how many contacts they had readily available.

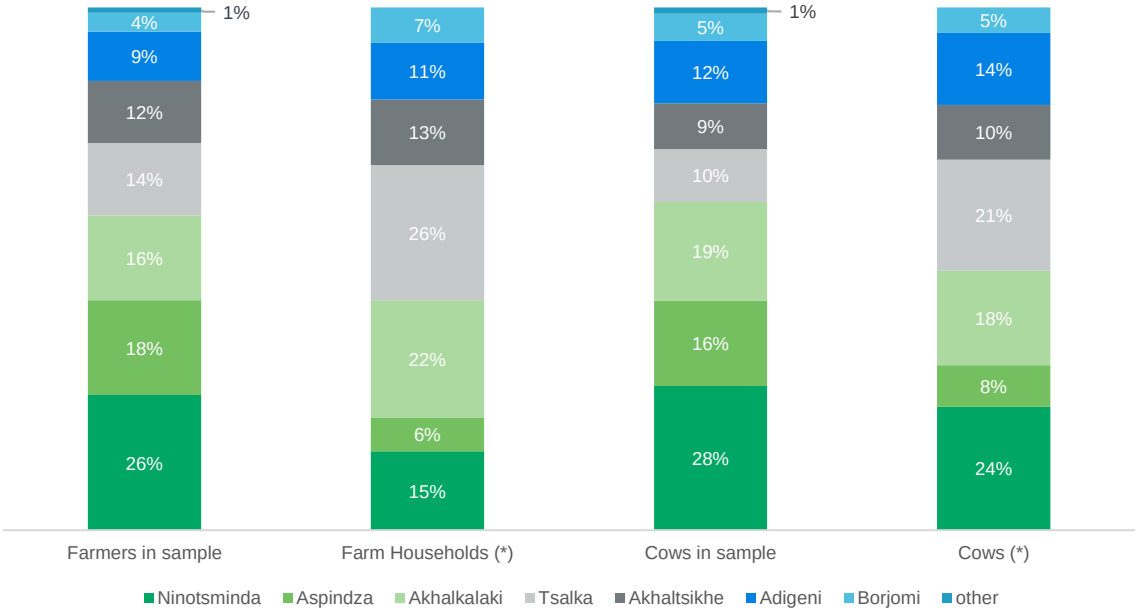
The study was conducted across all municipalities in the Samtskhe-Javakheti region as well as in the municipality of Tsalka from the Kvemo Kartli region. The geographic scope was determined by the potential to test new livestock insurance products within the scope of the MRRD project and to align with IFAD's other project regions. Figure 2 breaks down the sample by geography and compares the composition of the sample to the overall composition of the farmer and cow populations in the respective municipalities. The sample was not meant to be proportional to the total population in any given municipality. To what extent these findings are specific to Samtskhe-Javakheti/Kvemo Kartli or representative for the whole of Georgia remains to be seen and will require similar surveys in other regions.

FIGURE 1. SOURCE OF CONTACT DETAILS

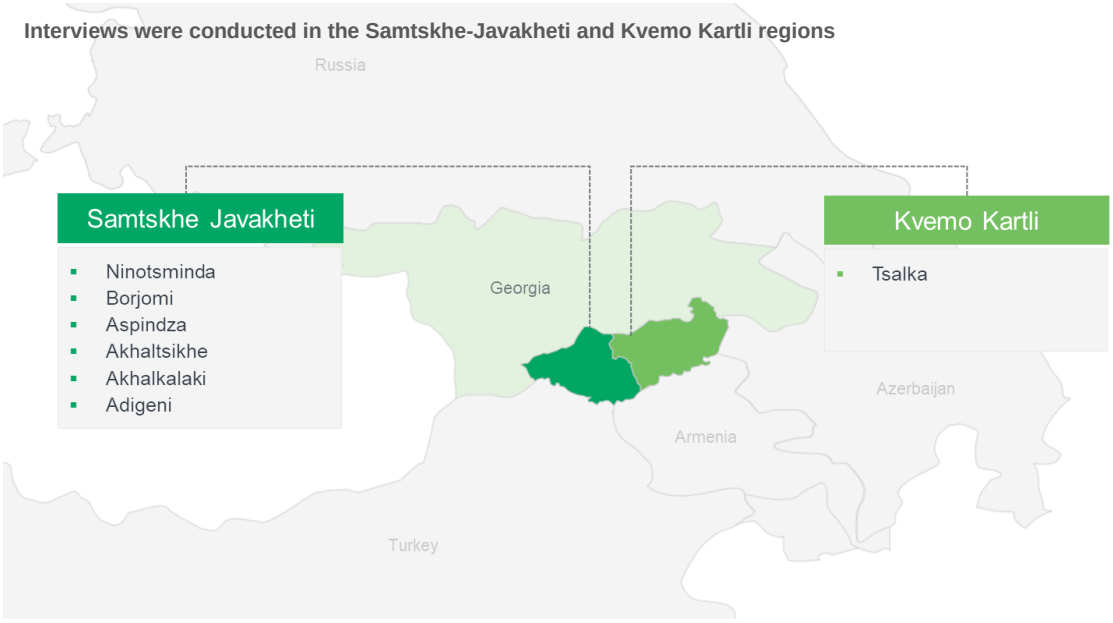


[3] At the time of the study, the MRRD project team was preparing for pilot testing of the livestock insurance product in two regions: Samtsckhe-Javakheti and Kvemo Kartli.

FIGURE 2. LOCATION OF SURVEYED FARMERS AND COWS COMPARED TO OVERALL FARMER POPULATION



Data marked with (*) sourced from Georgian Agricultural Census 2014



The response rate was high at nearly two-thirds of phone calls attempted. GFA contacted a total of 778 households in order to complete 501 interviews, which results in a success rate of 64%. There were almost no interviews abandoned mid-way, meaning that once a farmer had picked up the phone and agreed to participate, he or she finished the survey.

Key findings and implications

FARMER AND FARM CHARACTERISTICS

The typical farmer profile tends to be middle-aged males. For the farmers who took part in the survey, neither the age distribution nor the gender mix yielded any unexpected results. The single biggest age bracket for farmers is 41–55 years (40% of all farmers), with the age brackets 26–40 years and 56–65 years accounting for 23% and 25%, respectively (see Figure 3). The gender mix of respondents is 80% male and 20% female.

Farm size varies widely, but the median farmer has six cows. The total number of cows in the sample is 4,604, resulting in an average of 9.2 cows per farmer. However, the number of cows per farmer varies substantially between the minimum of one and the maximum of 90. Figure 4 shows the number of farmers in the sample (left axis), grouped by the number of cows they have (right axis). This shows that the single biggest group of farmers is the one having three to five cows, and the majority of farmers surveyed hold up to 12 cows. Farmers with more than 12 cows were a small proportion of the sample, but own over half of all the cows.

FIGURE 3. AGE DISTRIBUTION OF FARMERS

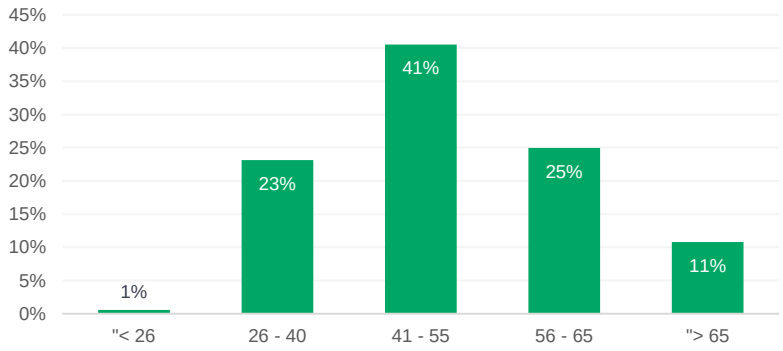
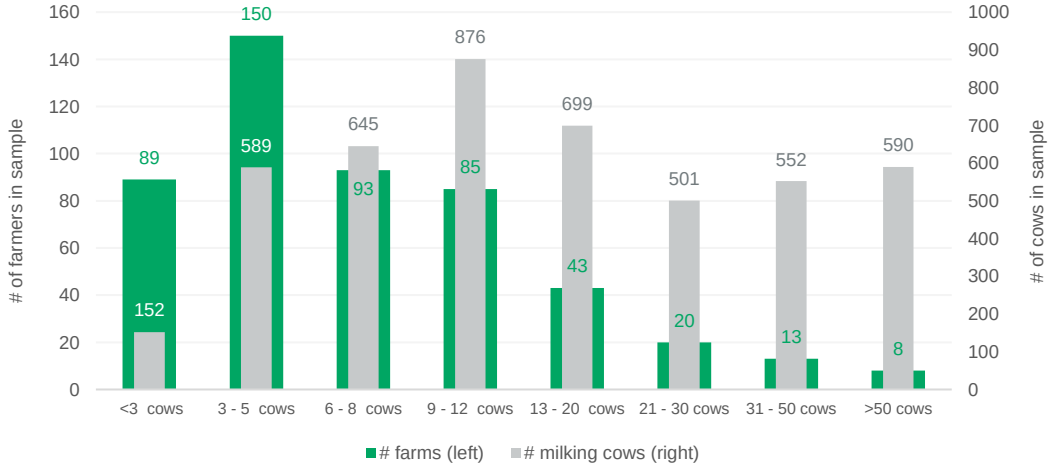
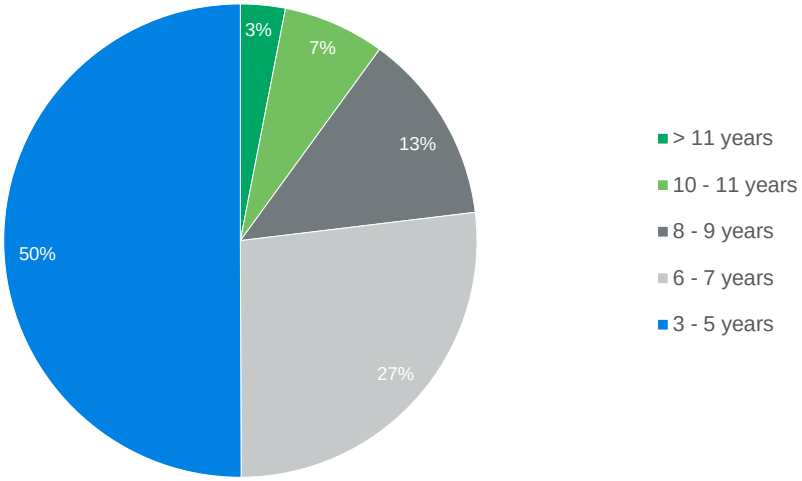


FIGURE 4. SIZE OF FARM HOLDINGS AND TOTAL NUMBER OF MILKING COWS



Median cow age is six, with the vast majority of cows under 10 years. An often-heard statement is that Georgian dairy cows are old. For that reason, the questionnaire had a section on the age of all cows in the sample. As shown in Figure 5, half of all cows are younger than six years and an additional 27% fall into the age bracket of six to seven years. Only 10% of all cows are older than 10 years. This finding was confirmed by the majority of key informants in Samtskhe-Javakheti when they were presented with these findings.

FIGURE 5. AGE DISTRIBUTION OF COWS (N = 4,604)



Insurance Implications Box 1: Farmer and farm characteristics

Eligibility criteria for livestock insurance include restrictions on cow age at enrolment because the intention is to cover unexpected deaths of productive cows. The age limit should be set so as to cover as many of the farmers' productive herd members as possible while managing the risk for moral hazard and fraud. This data shows that cow herds are typically younger than generally assumed, and indicates that farmers are actively managing their stock. An eligibility age limit set at 9 (and covering the animal for one year until age 10), would mean 90% of all cows in the sample would be eligible for enrolment.

FARM PRACTICES

Compared to dairy farming in Europe, Georgian smallholders typically adopt a low-input farming practice. Mechanization and investments into infrastructure such as improved cowsheds remain low, and targeted breeding effectively stopped with the collapse of the Soviet Union. However, many farmers do invest in their animals in several tangible ways.

Just over half of farmers invest in a herdsman during the summer months. Cowherding practices vary by locality, as the MRRD project team learned from previous field research: in some villages, farmers take daily turns looking after their animals as well as the animals of their neighbors. Those who have a bull are generally exempted from taking their turn, but incur the cost of feeding it during winter. In other villages, cows effectively roam freely and are not supervised, while in still other communities it is common practice to hire a herdsman during the summer months when cows are grazing. Herdsmen may look after anywhere from 20 to 80 animals, and while the herdsman obviously is responsible for the animals, he rarely has to compensate the owner should a cow die. The survey revealed that over half of all interviewed farmers (54%) hire a herdsman during the summer months. Reported costs vary widely, ranging from GEL 6 up to GEL 20 per cow per month (US$2–7)[4]. GEL 20 (US$7) per month for five to six months is a significant expense compared to a yearly income from milk of approximately GEL 1,500 (US$520), a figure estimated from previous farmer interviews.

Farmers are much more likely to purchase additional feed during the winter months, but almost 40% of farmers never offer their cows more than hay. During summer months, Georgian cows typically feed on pastures and only a quarter (23%) of survey respondents indicated that they would buy additional feed such as bran, barley, or combined feed. However, 57% of all farmers reported that during the winter they buy extra non-hay feed such as bran, beetroot, barley, or combined feed.

[4] GEL 1 = US$ 35 cents, sourced https://www1.oanda.com/currency/converter/ January 2020

The use of vaccinations beyond the government-mandated program is unclear, but almost half of farmers gave either preventative or treatment care related to the tick-born disease Piroplasmosis. The Government of Georgia currently provides several mandatory vaccinations for free – anthrax, brucellosis, foot and mouth disease, and nodular dermatitis – and as noted earlier, it is commonly accepted that this program has greatly reduced livestock deaths due to these diseases. The survey included questions regarding vaccinations that farmers purchase in addition to the mandatory ones. Unfortunately, these questions were not well understood by a number of respondents because the answers point to confusion between veterinary treatment against a condition and a prophylactic vaccination. It is therefore not possible to distinguish between those who actually vaccinated their animals against additional diseases and those who called a veterinarian in order to treat a certain condition. With this caveat in mind, the tick-born disease Piroplasmosis as well as blackleg (locally known as Emkar and predominantly transmitted by grazing on pastures contaminated by the bacteria causing it), were mentioned by 228 (46%) and 69 (14%) farmers, respectively.

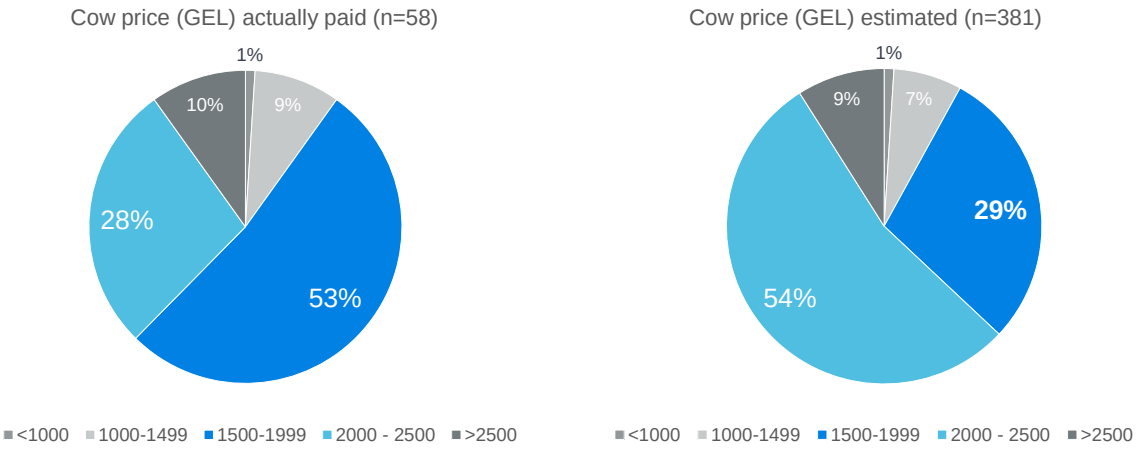
BUYING AND SELLING COWS

In the year prior to the survey, more than one-third of farmers sold at least one cow while 12% purchased a cow. One hundred seventy-four farmers sold 473 cows (about 10% of the total herd in our sample) and 58 farmers bought 175 cows (just 4% of the sample herd size). The fact that significantly more farmers sell rather than buy cows may seem surprising at first, but is not in the Georgian context: typically, farmers keep female calves and raise them to become milking cows instead of buying cows.

Increasing milk production was the primary motivation for new cow purchases. For over 70% of all cows bought, farmers indicated that their objective for investing in new cows was to increase milk production. Replacement for sick cows, at 18% of cow purchases, was the second most common reason given for buying new cows. However, almost all of these were bought by just one farmer who lost his entire herd (further discussed in section 3B regarding cow mortality). Other reasons include the desire to invest into better breed cows as well as the replacement for old cows sold (each 5% of all cows bought). Only one cow was bought as a replacement for an animal that died.

The majority of reported prices for cows range from GEL 1,500–2,500 (US$ 520–865). Farmers who bought a cow were asked to indicate the price they paid for it. Those who did not buy a cow were asked to estimate the price they would have to pay for a new cow. In both situations, about 80% of all prices fall into the range of GEL 1,500–2,500 (US$ 520–865) (see Figure 6). However, there is an interesting difference between those farmers who actually bought a new cow and those who did not but were asked to estimate the price they would have to pay. Of those who actually bought a cow, 50% indicated they paid between GEL 1,500–2,000 and only 30% paid the higher range of GEL 2,000–2,500. For the farmers who estimated the price, the proportion was inverse, with more farmers estimating a price in the higher bracket (GEL 2,000–2,500). Farmers who did not actually purchase a cow tend therefore to estimate higher prices than those who actually bought a new animal. Note that not all farmers gave an estimate of cow prices, which explains the difference between the total of 501 interviews and the 58 and 381 responses to this question, respectively.

FIGURE 6: COW PURCHASE PRICES – ACTUAL AND ESTIMATED



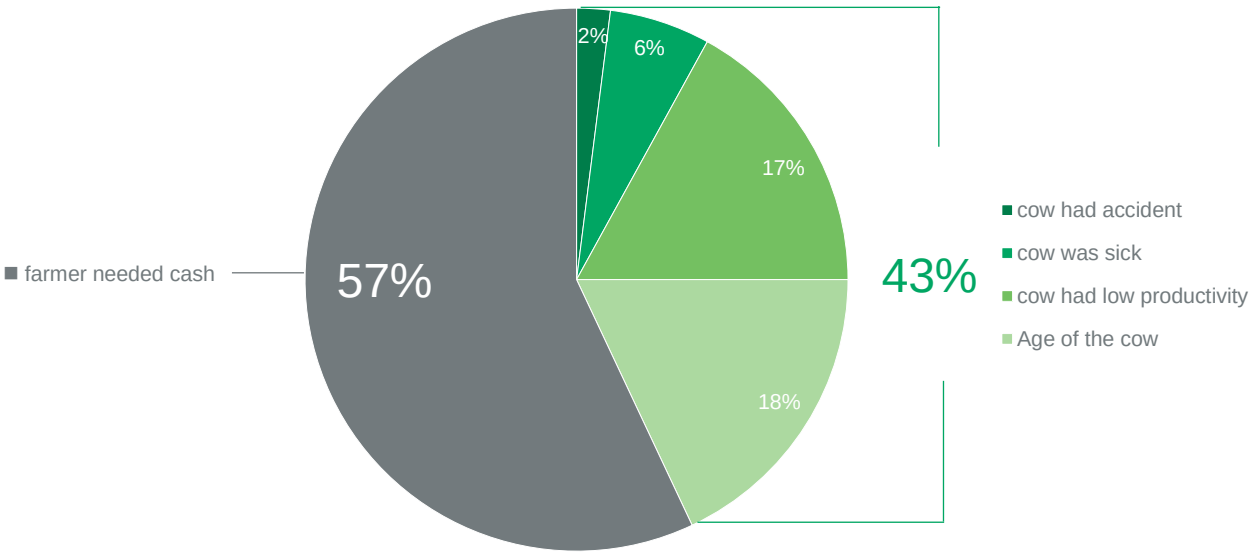
From this, we can conclude that the price of a new cow is either perceived as higher than what is actually paid or that farmers believe that if they buy a new cow it will be a higher-value (more productive) one. According to additional expert interviews, prices for cows differ by region and fluctuate throughout the year. However, the sample size of prices paid for cows is too small to perform a more detailed analysis with confidence. The seasonality aspect cannot be assessed based on our data because no related questions were included in the questionnaire.

Insurance Implications Box 2: Buying and selling of cows

Data from farmers regarding the value of cows can be used to determine a cover value for insurance policies. From a practical point of view, most microinsurance policies offer a single, uniform sum insured for all; objectively assessing the value of individual cows is likely to add significant costs without adding much value to the individual customer. The amount insured should be set such that it would provide real value to farmers in the event of a loss, but not so high as to encourage fraud or moral hazard. The survey data point to typical cow prices in the range of GEL 1,500–2,500 (US$ 520–865). This could be used as a proxy for the replacement cost of the animal after death, taking into account additional costs (search and transport of new animal) and lost income (milk) as well as potential salvage value from selling the meat. Additional focus group discussions conducted by the MRRD project team indicated that an insured value of GEL 1,000 (US$ 345) is attractive enough for farmers to consider insuring their animals. Lower cover values lead to significant reductions in interest and a higher sum insured may lead to significant moral hazard.

The primary reason (57%) farmers sold cows was a need for cash, while the remaining 43% of sales corresponded to a decrease in the value of the cow, due to such conditions as sickness, old age, or low productivity. Farmers who reported selling one or more cows were asked for their reason for doing so. As shown in Figure 7, by far the most sales (57%) were attributed to the need for cash. At the same time, at least 43% of cow sales were related to decreased value of the cow to the farmer (age, accident, sickness, or low productivity). It can safely be concluded that these animals were brought to slaughter; for animals sold for cash, it is unclear what happened with the animal because no information was gathered regarding the health status of the animal or to whom it was sold. However, because farmers are more likely to sell a cow than buying one (see above), it can be assumed that many of these animals sold by farmers that needed cash ended up at a slaughterhouse.

FIGURE 7: REASONS FOR SELLING COWS (N=473)



Insurance Implications Box 3: Reasons for cow sales

Several of the reasons that cows were sold are the same reasons that cows may die (cow is sick, has an accident, etc.). Under an insurance scenario that covers death due to any cause, some of these sales would effectively lead to a claim. For example, this could include a mandatory or emergency slaughter (sale) of cows with certain diseases or after an accident that did not kill the animal, but with no chance to get well again. In other cases, moral hazard or fraud could lead some of the sales to become "deaths." For this reason, insurers should consider this data when determining the premium.

COW MORTALITY[5]

Twenty-two percent of respondents reported one or more cow deaths. The survey asked farmers to report all cow deaths within the last three years. Out of the 501 respondents, 108 farmers (or 22%) reported at least one cow death during that period. Out of these, 85 farmers (or almost 79%) reported just one or two dead animals in their herd over the last three years, which suggests that in most cases, cows do not die due to highly contagious diseases that might wipe out the whole stock of a farmer or spread through the village.

Overall annual mortality rate of the sample can be estimated at 1.6% per annum. The total number of cow deaths reported for the three-year period stands at 219. Under the assumption of a stable herd size over the same period (4,604 animals in the survey), this leads to an overall yearly mortality rate of 1.6%. The survey did not include questions about when the cow deaths occurred and therefore it is impossible to say anything about trends or spikes in mortality, which would require a different research set-up.

Insurance Implications Box 4: Mortality rate of cows

For the geography and farmer population studied, the survey data yield an overall "base" mortality rate of 1.6%. This is much lower than most estimates received from a variety of stakeholders and should be considered when establishing a risk premium for livestock insurance. As explained above, there are certainly good reasons to add some of the cases that were picked up in the survey as animal sales and not as losses. In our sample, sales due to accident or illness would represent an additional 0.8% added to the mortality rate[1] if fully absorbed into a premium.

TABLE 1. MORTALITY RATE BY HERD SIZE

HERD SIZE	# FARMS	# COWS	# DEATHS (OVER 3 YEARS)	MORTALITY RATE (AVERAGE PER YEAR)
1 - 5 cows	239	741	56	2.5%
6 - 12 cows	178	1,521	63	1.4%
13 – 30 cows	63	1,200	52	1.4%
31+ cows	21	1,142	48	1.4%
Total	501	4,604	219	1.6%

[5] Mortality was calculated with the number of reported milking cow deaths in the last three years, with the assumption of a consistent herd size over the last three years (data on herd size reported for most recent year only).

Farmers with the smallest herd sizes experienced higher mortality rates. Table 1 shows the breakdown of mortality rates by herd size clusters. The results suggest a higher mortality rate for smaller stocks up to five cows, while it plateaus out at 1.4% for herd sizes of six cows or larger. Even within the farm size of one to five cows, the smaller farms seem to have higher mortality rates than the slightly bigger ones: farms with one or two cows experienced a mortality rate of 4.2%, while those with three to five cows experienced a mortality rate of 2.1%. However, the absolute number of farms, cows, and cow deaths within the one to two cows cluster is too small to analyze the results with confidence and hence suggest looking at the one to five cows cluster as a whole. The tendency towards higher mortality rates for smaller holdings can potentially be explained by lower levels of professionalism of smallholder farmers compared to their peers with slightly higher numbers of animals. When looking at cause of death, farms with up to five cows were more likely to have deaths due to disease, complicated calving, and bloat.

Mortality varied by municipality, but not dramatically, with the exception of an outlying "outbreak" in Akhaltsikhe. A breakdown of mortality rates by municipality is provided in Table 2. Again, results should be interpreted with caution due to some rather small sample sizes (for example, the lowest mortality rate is reported from Borjomi, but this reflects only six cow deaths, which is too few to base any credible statistics on it). Apart from the mortality rate of 4.3% in Akhaltsikhe, no significant differences between municipalities can be detected. The mortality numbers for Akhaltsikhe are heavily driven by one single farmer.

TABLE 2. MORTALITY RATE BY MUNICIPALITY

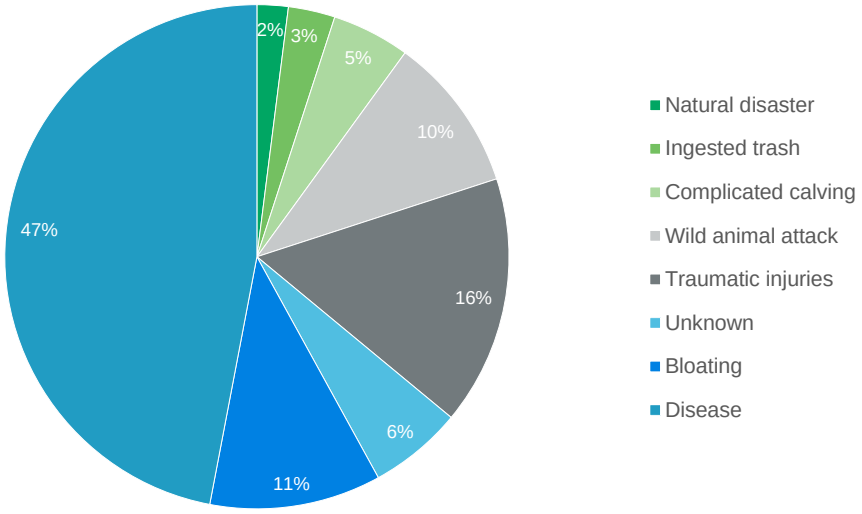
MUNICIPALITY	NUMBER OF COWS	NUMBER OF DEATHS (3Y)	MORTALITY RATE (ANNUAL)
Adigeni	551	26	1.6%
Akhalkalaki	869	32	1.2%
Akhaltsikhe	402	52	4.3%
Aspindza	752	43	1.9%
Borjomi	239	6	0.8%
Ninotsminda	1,271	36	0.9%
Tsalka	465	20	1.4%
other	55	4	2.4%

One farmer from Akhaltsikhe municipality with 30 cows reported the loss of her total stock. Therefore, an individual follow-up interview was conducted to confirm the reported data. She confirmed that she had lost 30 cows over a period of several months. Moreover, she reported that she was not the only one in her village who lost cows. In most cases, Piroplasmosis was the cause of death. These cases help explain the relatively high mortality rate for Akhaltsikhe municipality as reported in Table 2.

Additional analysis regarding mortality rate was conducted according to whether farmers supply milk to dairy processors as well as according to the types of practices employed (hiring a herdsman, purchasing enhanced feed, or giving additional vaccinations), but no significant correlations were found. Equally, there was no significant difference between farmers whose contact details were obtained through cheese manufacturers and those from the GFA database.

Disease accounted for almost half of deaths, and almost two-thirds of deaths were due to causes not covered by existing livestock insurance policies. The survey data strongly suggest that the single most common cause of death, with 47% of all cases, is linked to diseases (see Figure 8). The second most common cause of death is traumatic injuries (accounting for 16%), followed by bloating (11%) and death caused by wild animal attacks (10%). Unknown causes and complicated delivery account for 6% and 5%, respectively. Though the survey data do not contain information on the type of diseases that caused the cow mortality, prior focus group discussions and expert interviews point to Piroplasmosis and Emkar as leading diseases currently causing death in Georgian cows.

FIGURE 8: REPORTED CAUSES OF COW DEATHS



Insurance Implications Box 5: Causes of cow mortality

Disease and bloat are common exclusions in existing livestock insurance policies. The data show that by excluding these as well as "unknown" causes, a policy would effectively cover only 36% of all cow death cases experienced by farmers. An insurance policy that would only cover accident-like cow death is therefore a poor value proposition and should be avoided. Given the fact that overall mortality has been reduced due to the government-sponsored vaccination program and has now reached a level that looks manageable, an all-risk mortality cover appears to be a possibility. In fact, based on discussions with farmers, it is reasonable to assume that excluding losses linked to disease makes livestock insurance a non-starter. In addition, the number of losses could be further reduced through better animal husbandry and preventive care. This primarily requires behavioral change on the part of the farmers as well as improved offers from service providers.

Summary of implications for livestock insurance in Georgia

An important objective of the MRRD project is to support the development and pilot testing of improved livestock insurance that is sustainable and valuable to farmers. This is also the main driver for the research on cow mortality presented in this report. Some of the key questions when designing livestock mortality insurance products are:

i) Which risks should be covered?

ii) Which animals should be eligible?

iii) How much should the cover value be?

iv) What is a reasonable risk rate?

Cover: all-risk mortality. Based on the survey findings, the first question is relatively easy to answer: an all-risk mortality cover seems imperative. Though many insurance companies are not in favor of covering disease-linked mortality, it is important to recognize that any product that would exclude diseases (and bloat and unknown causes) would effectively cover only 36% of all cow death cases experienced by farmers. Such a product is likely to be perceived by the majority of farmers as not attractive enough to buy insurance at all, giving little chance for take-up of voluntary livestock insurance in Georgia.

Eligibility: dairy cows up to 9 years. Regarding the eligibility criteria for animals, the data on cow age distribution suggest to include cows with an age up to 9 years at the point of subscription (meaning the animal would be 10 at the end of a one-year policy). Such an age limitation would still cover 90% of all cows. Note again that only milking cows are studied in this report, which implies a minimum age of 3 years.

Sum insured: GEL 1,000. From a practical point of view, a single, uniform sum insured for all cows held by smallholders appears to be the most appropriate despite the fact that farmers report varying purchase prices of new cows. Objectively assessing the value of individual cows is likely to add significant costs without adding much value to the individual customer. The survey data indicate that typical cow prices are in the range of GEL 1,500–2,500; to avoid moral hazard and fraud risks, insurers would want to offer a cover value that is slightly less than full replacement cost, but still valuable to policyholders. Additional focus group discussions indicated that an insured value of GEL 1,000 is attractive enough for farmers to consider insuring their animals, while cover values lower than that lead to significant drops in interest.

Risk rate: ~ 2.4%. For the geography and farmer population studied, the survey data yield an overall mortality rate of 1.6%. In addition to this mortality rate based on reported deaths, it would be prudent to add the reported sales of cows due to accident or illness because these cases would likely be presented as an insurance claim. These sales represent an additional 0.8%.

Taken together, these elements should allow interested insurance companies to take a new approach to insuring the 500,000 milking cows held by Georgian smallholders. Some bold steps are still required, but the data presented in this report can help to better assess the risks involved and manage them appropriately, while offering an attractive protection to the country's smallholder farming community.

Conclusion

In the absence of official or otherwise reliable mortality data on dairy cows in Georgia, a structured quantitative survey has proven very helpful to shed light on this crucial topic. With reported mortality at 1.6%, cow mortality appears lower than what many stakeholders suggested. Even if the sale of sick animals and those who suffered an accident are included, the rate remains significantly below what insurers suggested is happening on Georgian farms. Diseases are the leading cause of death, which makes insurance products that cover only accidental deaths an undesirable value proposition to farmers. An all-risk mortality cover for Georgian smallholders looks feasible, and the results of this survey should provide insurers with enough "ingredients" to determine a fair premium.

Appendix 1: Questionnaire

Demographic information

1. Gender
   a. Male
   b. Female

2. Age
   a. <26
   b. 26 – 40
   c. 41 – 55
   d. 56 – 65
   e. >65

3. Name of municipality
   a. Adigeni
   b. Akhalkalaki
   c. Akhaltsikhe
   d. Aspindza
   e. Borjomi
   f. Ninotsminda
   g. Tsalka
   h. Other

4. Name of village _____

Herd information

5. How many cattle do you have in total (milking cows, heifers, calves, bulls)? _____
6. How many milking cows do you have? _____
7. How many of the milking cows are:
   a. 3 – 5 years
   b. 6 – 7 years
   c. 8 – 9 years
   d. 10 – 11 years
   e. >11 years

Sale and purchase of cows

8. Did you buy any milking cows last year?
   a. No
      i. If you did decide to buy a milking cow, what would the price be? _____
   b. Yes
      i. How many? _____
      ii. What was the price for it (them)? _____
      iii. Why did you buy one? (*mark all that apply*)
         a. To replace a cow that died
         b. To replace a cow that was brought to slaughter
         c. To replace a cow that was stolen
         d. As an investment to increase production
         e. Other: _____

9. Did you sell any milking cows last year for any reason?
   a. No
   b. Yes
      i. How many _____
      ii. Why did you sell them? (*mark all that apply*)
         a. Illness
         b. Low productivity
         c. Accident
         d. Needed cash
         e. Winding down business
         f. Other: _____
      iii. How old were they? _____

Cow mortality

10. Have any of your milking cows died in the last 3 years?
    a. No
    b. Yes
        i. How many? _____
        ii. What were the causes? (*mark all that apply*)
            a. Wild animal attack
            b. Traumatic injuries
            c. Falling from a mountain
            d. Diseases
            e. Bloating
            f. Other: _____
        iii. How old were they? _____
        iv. What did you do to replace them? (*select one*)
            a. Didn't replace them
            b. Purchased a milking cow
            c. Purchased a calf
            d. Other

Dairy farming practices

11. In addition to the vaccination provided by the Government, do you pay for extra vaccinations?
    a. No
    b. Yes
        i. What did you vaccinate against? (mark all that apply)
            a. Emkar
            b. Piroplasmosis
            c. Other: _____
12. Do you pay a shepherd for looking after your cows?
    a. No
    b. Yes
        i. For how many months per year?
        ii. How much does it cost per cow, for the whole season?
13. During the summer, do you buy extra feed or feed supplements for your milking cows?
    a. No
        i. Have you done so in the past?
            a. No
            b. Yes
        i. What did you buy? _____
        ii. Why did you stop? _____
    b. Yes
        i. What type of feed? _____
        ii. How many kg per cow per week? _____

14. During the winter, do you buy extra feed or feed supplements for your milking cows?
    a. No
        i. Have you done so in the past?
            a. No
            b. Yes
                i. What did you buy? _____
                ii. Why did you stop? _____
    b. Yes
        i. What type of feed? _____
        ii. How many kg per cow per week? _____

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IFAD
Investing in rural people

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This report highlights some key implications for the design of valuable livestock insurance for Georgian smallholder dairy farmers. The interpretations here represent the authors' opinions on how the data supports product design, and are not those of Milliman or IFAD. Milliman does not intend to benefit or create a legal duty to any third-party recipient of its work. In performing any analysis in this study, the research team and authors relied on data reported by Georgian smallholder dairy farmers. If the underlying data, information, or assumptions are inaccurate or incomplete, the results of our analysis may likewise be inaccurate or incomplete.