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Evaluation of losses incurred in goat farming in rural tribal area of Akkalkuwa: A case study

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Abstract

Akkalkuwa is a tribal tehsil situated in northern Maharashtra. The economy is primarily agrarian and animal husbandry is an important subsidiary occupation. Goat farming is an important subsidiary occupation in this region. A study was carried out to ascertain the mortality pattern and avenues of losses among the adults and the kids. The losses were classified under two distinct heads, viz. losses due to loss of life and losses due to loss of production. The underlying causes of the incurred losses were ascertained by questionnaire and available records from four veterinary hospitals. The study was carried out in 64 villages across Akkalkuwa tehsil which had a goat population of 1000 and above. Diarrhoea, Pneumonia, Navel ill, tetanus were important causes of loss of life in kids while diarrhoea, inter-partum related events, pneumonia, chemical toxicity, accidents and thefts were important causes in adults. Diarrhoea stands as the most important cause of death in adult goats and kids. The estimated losses due to loss of life and loss of production are significant, kid mortality alone leads to an estimated loss of Rs. 1.7 million per annum while adult mortality leads to losses valuing Rs. 12.01 million per annum. The losses due to loss of production due to abortion and still births were estimated to Rs. 5.5 million per annum. To contain these losses there is an immediate need to bring awareness, education, extension, participation in prophylaxis, scientific management into practice.

Keywords: Akkalkuwa, goat farming, kid mortality, mortality rate, rural goat farming, scientific management

Introduction

India is an agrarian economy where an estimated 70% of the population is engaged in agriculture and allied occupations. In rural sector of India 80% of its population engaged in agriculture. Agriculture contributes to 17.32% of the total Gross Domestic product (GDP) of the country. Animal husbandry and allied sector contributes 25.6% of the total contribution made by agriculture. Rural economies are greatly dependent on the agriculture which is primarily rain fed. Animal husbandry is a subsidiary source of income to the farmers. Goat farming is an important source of income to marginal land holding families. Goat is a sturdy animal and has a capacity to convert low grade roughages to high quality milk and meat protein. Goat farming is largely unorganized in rural villages of India. Families rearing from 1 LU to 5 LU (LU = Livestock Unit) are generally seen in the villages. In the remote tribal areas goat farming is an important subsidiary occupation generating income and livelihood to the rural marginal land holders. In the current study, we try to access the avenues of losses incurred by tribal rural goat farmers and means to contain them.

The current study was carried out in 64 villages of Akkalkuwa tehsil of Nandurbar district in Maharashtra state of India from 2013 to 2018. Akkalkuwa is situated in the Satpuda ranges at 21.55°N 74.02°E, it is margined by river Narmada on the north, Akarani and Taloda tehsil in the east and state of Gujrat in the south and the west. 12.2% of the total population resides in urban areas while 87.8% resides in rural areas. The majority of the population here is tribal with 81% of the families engaged in agriculture and allied activities. Animal husbandry is an important subsidiary occupation. Goat farming is an important activity in the Satpudas and is practiced without much modernization. There were a total of 14000 goats in the selected villages with majority of the goat population belonging to the non-descript class. Goat farming is critical asset in these areas as it provides livelihood to the poor rural families, milk and meat are good protein source for the sickle cell anemia ridden population.

Materials and Methods

The aim of this study was to ascertain the major causes of losses to goat farmers in terms of life and production. In order to achieve the goal 64 villages were selected and data was collected using a questionnaire. Data available from four veterinary grade I clinics was studied from 2013-2018 to identify major causes of losses in goat farming. The losses were broadly classified as losses incurred due to loss of life and losses due to loss of production.

Results and Discussion

A. Losses incurred due to loss of life

The economics of goat farming depends on number of offspring the foundation stock brings forth each breeding season. The kid crop brought forth contributes to the fresh blood in the herd. Surplus males make it to the market to provide economic gains to the farmer. Projected profit falls steeply when the flock suffers mortality. The losses are dual as farmers lose new kid crop and revenue that could be raised from sale or breeding of the lost animals. Under scientific rearing a mortality of 5% is generally considered acceptable, however in rural free range system where feeding and scientific management is lacking the losses on account of mortality may range from 10-40% (Mandal *et al.*, 2007; Kashem *et al.*, 2011; CIRG 2000) [21, 16, 20]. Mortality impedes the flow of income and the farmer has to sustain the farming by investing more capital to meet expected level of production.

The mortality pattern in kids and adult goats was studied separately to understand the gravity of the losses at each stage. In the kids, diarrhea, pneumonia, navel ill, debility, malnutrition and tetanus were the major cause of mortality leading to a significant economic loss to the farmers. In adults diarrhea, inter partum related events, chemical toxicity, natural calamity, accident and theft were sizeable causes of mortality.

Diarrhoea

It is the most important cause of mortality in adults and kids. The death in kids is very common owing to lack of deworming, unhygienic housing, overcrowding, lack of immunization against common infectious diseases, lack of clean water supply and delayed veterinary intervention (Gupta and Sengar, 1985; Soundarjan *et al.*, 2004) [4, 14]. The mortality rate is high as goats do not receive veterinary care in early phase of the disease and immunization efforts are not received with utmost vigil (Vihan *et al.*, 1992). Low literacy rate in region is a major cause of ignorance among the goat farmers. It is a common observation that goats suffering from diarrhoea are treated by tying a rope at the stifle joint or at the base of the tail. These practices do no good in the recovery of the affected animals and lead to dehydration thereby compromising the survival of the affected animals.

Pneumonia

The second most important killer of goats and kids of the region. Lack of proper housing, immunization, parasitism, anaemia, lowered immunity, stress and delayed veterinary care are the major reasons ascertained in the area. Death in kids is more in the winter season from November to January, while in adults the cases of pneumonia surge in rainy season from July to September (Sabapara and

Deshpande, 2012) [11]. However the mortality rate in adults is low as compared to the kids.

Navel Ill/Omphalitis

Care and management of the neonates is cardinal for a strong and healthy flock. The number of deaths owing to the complications of navel ill – omphalitis are significant in the region. Since the neonates are housed on soiled floors in an overcrowded and unhygienic manner, the drying and healing of the placenta in the first week of life is intervened by suppurative infections leading to death of the stressed neonates (Lodh *et al.*, 1993) [15]. Deaths in neonates and kids are significantly high in the region. The deaths due to navel ill and associated suppurative infections are totally preventable. Educating farmers and animal owners regarding the post kidding care of the dam and the neonate can help preventing the deaths in neonates. Cleanliness is an important practice that must be followed in the goat housing and sufficient ventilation is a must to ensure proper drying of the floor.

Tetanus

Tetanus is caused by a gram positive bacteria *Clostridium tetani* in many species of domestic animals. The disease is characterized by fever, spasmodic contraction of skeletal muscles, stiff gait, prolapse of third eyelid. In the region sporadic cases of tetanus have been reported in kids and adults. The neonates are infected through contaminated umbilicus while in adults deep wounds, open method of castration, post parturient contamination are major causes of infection. Tetanus causes significant economic losses due to kid crop failure. The disease is preventable and preventive immunization is a must to ensure that the herd does not contract the disease.

Debility/Anemia/ Malnutrition

The management system is basically based on free range grazing of forests and agricultural land post harvesting. In recent years majority of the forest land has been diverted to cultivation due to which available green fodder have depleted. The goats are fed with farm refuse and agricultural waste that is stored for the whole year. Low grade roughages have led to protein-mineral-vitamin deficiencies due to which debility, anemia and malnutrition are quite prevalent in goat population of the region. The debilitated animals are immune-compromised and succumb to opportunistic infections leading to loss of life and following economic repercussions (Daba *et al.*, 2012) [9].

Interpartum related events

When significant population resides in remote villages and the literacy rate is low, awareness of the goat farmers regarding the parturition and post parturition events is marginal. In cases of dystocia, retension of placenta, prolapse of the uterus, metritis, pyometra and other such affections the time of onset and veterinary intervention plays a key role in preventing the losses. Losses of life in parturient does were found due to extended unattended dystocia, retension of placenta, uterine prolapse. In many cases losses were bilateral and caused death of the neonates as well as the dams. Dystocia leads to significant parturient doe mortality in the region.

Predation

Many villages in Akkalkuwa taluka are in the vicinity of forests. Large scale deforestation to accommodate more land for agriculture has led to an intense man-animal conflict. Due to the non-availability of the natural prey in their wild habitat, goats are attacked by leopards, wild cats and significant number of such conflicts has been recorded each year. Dog nuisance is another crucial problem in the semi urban area of the Akkalkuwa taluka. Availability of food in the form of openly disposed slaughter house and domestic waste have led to inflation of the stray dog population. On an average cases of dog bite are treated in various veterinary institutions across the region of which 94.58% are in the semi-urban areas of the region.

Natural Calamity

Akkalkuwa taluka is a hill terrain and is prone to uncertain rains. Due to the prevalent animal husbandry practices the animals are often exposed to various harsh environmental conditions that lead to loss of life. Heavy rains, hailstones, lightening, flooded rivers are various natural calamities that take a toll on the livestock of this region. Heavy rains accompanied with hailstones often take toll of the grazing goats as they do not find shelter in heavy rains.

Chemical Toxicity

Akkalkuwa is an agrarian community and with the introduction of extensive modernization in agriculture, modern weedicides, pesticides, fertilizers and other chemicals are extensively used in the fields. The farmer has prospered due to increase yield in the recent years. However, the cases of mass chemical toxicity due to runoffs from agricultural land to nearby drinking water source are common. Though the rate of incidence is low but the losses incurred are large as whole flock is affected by such incidents. Unwarranted use of ectoparasiticidals to control tick, lice and fleas has at times resulted into sporadic incidents of death in the goats.

Plant Toxicity

Since the majority of the animals are under free grazing practice, incidents of plant toxicity are common. The goats browse the nearby forests and spend most of the time of the day browsing. The grasses are amply available in the months of August to February after which the available grazing resources are quenched. In the season of scanty vegetation plants like the Castor (*Castor ricinus*), Dhatura (*Dhatura stramonium*), Besharam (*Ipomea carnea*) and Lantena (*Lantena camara*) that are the commonly found in this region. Of the above the castor and dhatura toxicity is acute and at times lethal. Losses are significant in adults and often the flock has many affected animals.

Envenomation

The injection of venom by sting of animals is called envenomation. Snake is an important agent causing innumerable deaths in humans and livestock of this region. Among the venomous snakes cobra, pit viper, saw scaled viper are all found in this area. The goats are generally stung when they go out for grazing and if the veterinary aid is delayed death supervenes.

Accidents

Automobile accidents are an important cause of death in

goats of this region. Most of the goats are free grazing even in the semi urban areas that have a heavy traffic during the peaks hours of the day. Most of the accidental deaths are due to four wheeler automobiles and heavy vehicles spare a little chance of survival. Events of fire outbreak in the barn/house have been documented where loss of goat life has occurred. Lack of fire safety, mud and wood built barns predispose the animals to fire susceptibility. The losses incurred by the goat farmer are very high with the pressure to start up the enterprise over again from inception which requires additional economic inputs.

Theft

Many cases of theft of goats are reported in the local police offices in the areas. The goats graze freely in the streets and markets of the semi-urban areas of Akkalkuwa making them prone to theft. The goats are stolen from the area and sold to the slaughter houses or other farmers in another remote corner of the state. The animals are not tagged or microchipped making it difficult even to identify the animal. Theft leads to loss to the goat farmers and affects the economics of the farming.

B. Production losses

The main sources of income from goat farming in Akkalkuwa region is from the sale of kid crop. The economics of goat farm is thus greatly dependent on the number of individual animal it can rear up to marketable age and weight. The faster the animal approaches marketable weight the greater is the profit to goat farmers. However under unorganized, free ranging system where scientific management is still in infantile stage, the flocks of goats have a very slow growth rate and marketable weight is attained at a very late stage of life. Thus the farmer has to bear additional burden of rearing and feeding the slow growing stock. Owing to the malnutrition at each kidding number of individuals that are brought forth is reduced, leading to less units of kids being raised and marketed. Overall a vicious circle of malnutrition and loss of production straddles the economy of the goat farmers

Malnutrition

A study of 400 bucks was carried out from selected villages and their weight was recorded. The data so obtained clearly indicated that at every stage there was considerable difference in the average weight and the highest weight recorded in the category. The deficit of the weight gain leads to economic loss to the goat farmer due greater cost of rearing. The cost for young bucks is more as their meat is tender, due to the delay in reaching marketable age the farmers kid produce often gets less price as compared to market price.

It is a common observation that no provision of minerals, vitamins and proteins was made in the growing stages of the kid crop. Owing to the energy protein malnutrition the kids failed to keep up the growth rate and suffered slow growth rate. Mineral and vitamin deficiencies lead to anemia, weakness and loss of condition. The nursing does also did not receive any extra ration during pregnancy nor during the lactation. Many does were reported to suffer from agalactia. This led to the deterioration of the body condition of the dependent kid. Agalactia in does often resulted into the death of the kids due to opportunistic infection owing to the compromised immunity.

Mastitis

The infection in the mammary tissues are serious and need immediate attention. Mastitis is characterized by the inflammation and growth of microbes in the alveolar tissue. The mineral and vitamin deficiencies prevalent in the area predispose the does to mastitis. Lack of clean housing, overcrowding, malnutrition, stress and compromised immunity lead to incidences of immunity. In many cases the veterinary intervention is delayed and this led to permanent fibrosis of the mammary tissue leading to permanent loss of production.

The economic losses due to mastitis in goat production are immense. Not only is the weight gain of the growing kids compromised but also the health concerns of the goat in the herd lead to additional economic burden to the farmer.

Abortion

The kid crop is the main source of income to the goat farmers in Akkalkuwa region. The incidences of abortion in goats leads to loss of fetus and associated breeding issues set in. In many of the cases the mineral and vitamin deficiency, infection, malnutrition, trauma, accidents and toxicity are the main causes of abortion in the region. The abortion is left unattended leads to further breeding complications. The kid crop harvested per year is often reduced leading to huge economic losses to the farmer.

For a sustainable goat farming the basic principles are high twinning/ triplet ratio, high FCR (Feed Conversion Ratio), minimum mortality, maximum kid crop yield. In the current study, the average number of goats reared by a family household is seven. The Goats are reared as a reserve income for family emergencies and milk obtained from the goats is used as a source of protein. The dung is utilized as manure in the farm after drying for a period of 90- 120 days. The surplus bucks are sold after they attain a weight of 17-20 Kgs, generally after 24-30 months. The females are retained in the herd for breeding. The management of the herd is primitive and lacks scientific values, the herd is allowed to graze in the fallow or common land. The farm refuse like husk, pods, grains etc make a marginal concentrate feeding. However only 38% of the farmers regularly deworm their goats and 78% participate in the vaccination programmes. The provision of potable water is absent and major part of the year the goats are watered at the waters sources like streams and rivers. The water is often polluted with human activities and serves as a source of infection to goats. Housing is typically limited to *kuccha* mud plastered houses made from locally available twigs, dung and mud.

According to department of Animal Husbandry, Nandurbar there are 26,000 goats in Akkalkuwa tehsil spread across 198 villages. Assuming 60% of them were breedable females and had kidding once in a year 15600 kids will be produces in a year. However the current study estimates 32% mortality in the kids, leading to loss of 4992 kids every year. Assuming a average value of rupees 350 per kid at three months age, an estimate loss of 1.7 million per annum can be predicted. Similarly in the adults a mortality rate of 22% predicts loss of 3432 adults a year valuing 12.01 million per annum. The losses due to loss of production due to abortion and still births would be around 5.5 million per annum. The findings are analogous to the findings of Ershaduzzaman *et al.*, 2007^[22] in who reported a mortality

of 28.97% in kids, 22% in young goats and 11.78% in adults in Bangladesh.

Mortality influences the profit and sustainability of goat farming. Analysis of the mortality pattern reveals that important causes of mortality in adults in Akkalkuwa region are diarrhoea, debility, pneumonia, chemical toxicity, predation and natural calamity. Inter partum related events are also an important cause of mortality in adult goats. The mortality pattern in kids (0-6 months) identifies diarrhoea, pneumonia, debility, anaemia, navel ill and natural calamities as the major killers. The findings are similar to Bobade and Barbind, 2002^[13] who conducted the study in Beetal X Osmani kids. The results are also in complete agreement with Paliwal *et al.*, 1978^[19]; Krishna *et al.*, 1979^[18]; Mazumdar *et al.*, 1980^[7]; Koul *et al.*, 1988^[6]; Mandal *et al.*, 2007^[21]; Kashem *et al.*, 2011^[16]; CIRG., 2000^[20]. The fact highlights that in the developing world, where the study was conducted; a heavy loss due to mortality in kids and adults is prevalent. The mortality in adults and kids significantly affects the economics of goat farming and leads economic loss to farmers (Sakthivel *et al.*, 2012)^[10]. Goat farming as a subsidiary income among low income families in the region is very common and uncontained losses in the goat farming leads to financial instability.

In conclusion, only way to contain these losses is scientific management of goat farming. A vigilant effort to educate the farmer on various scientific goat management practices will be the first step in alleviating the losses suffered by the farmer (Ershaduzzaman *et al.*, 2007)^[22]. The farmers can be exposed to hands on training or exposure visit where they can see and learn the concepts of scientific management. Goat farmers are the most important stakeholders and their participation and education is the most important step in minimizing the losses at field level (Kumar *et al.*, 2003, Poonia and Malik, 2012)^[12]. The veterinarians play a very crucial role as they are responsible for the extension education of the rural farmers on health and management issues. Poverty elevation efforts of various government bodies have to work in collaboration to assist the animal husbandry department in creating awareness among the masses.

Competing interests

The authors declare that they have no competing interests.

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