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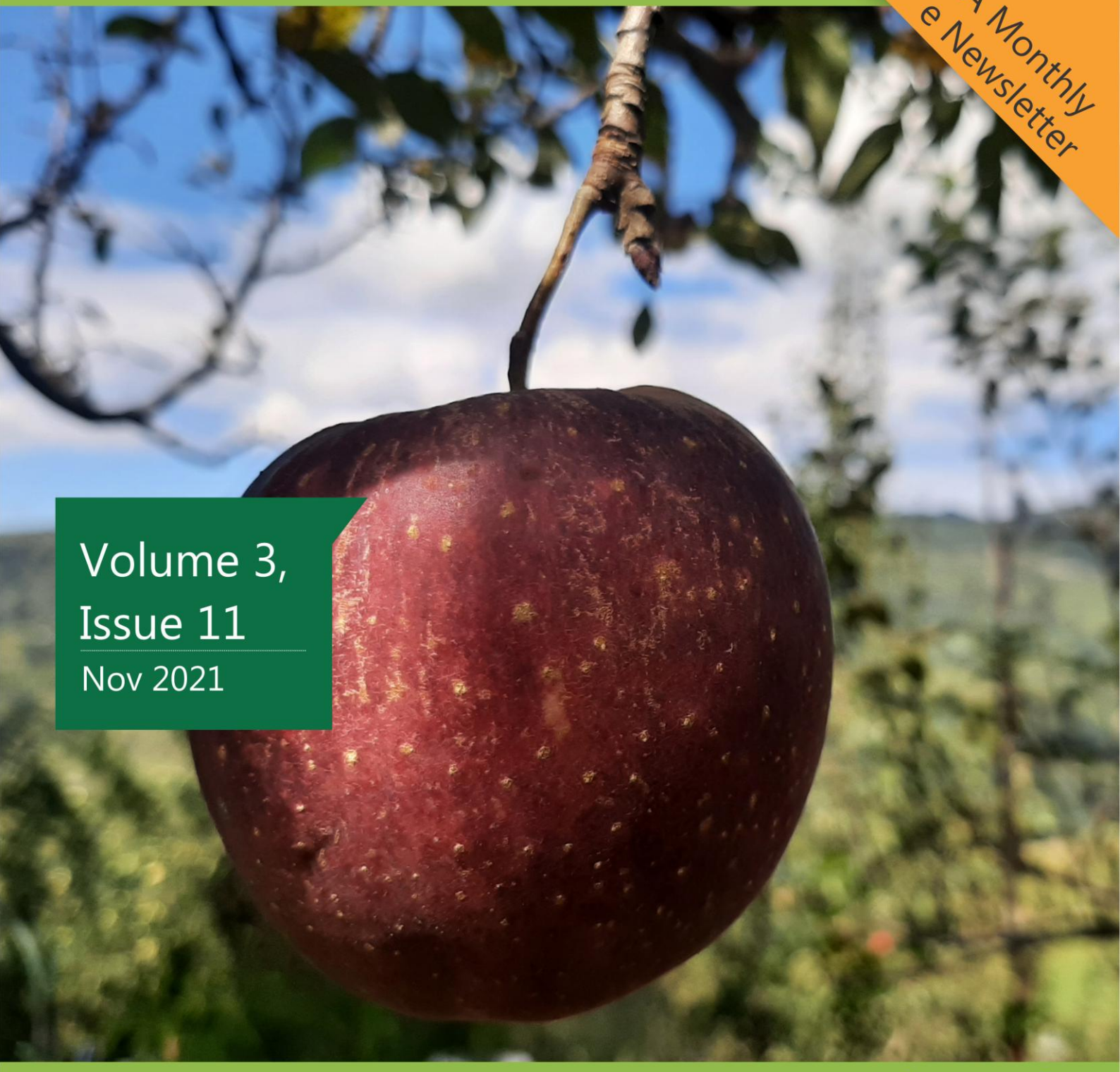

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Growing seed

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DIGITAL MARKETING IN AGRICULTURE

Article Id: AL202193

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Agricultural Marketing plays a very important role in moving agricultural products from the farms to the consumer. Marketing is customer oriented and it provides farmers, traders, processor etc., with the profit. In the modern era everything is spelled with "e" ie., through electronic media. Digital marketing plays a prominent role in the field of agriculture to have more profits to the famers.

What is Digital Marketing?

Digital marketing is the promotion of various agricultural produces via electronic media. The advertisement may be done via the internet, mobile phones, social media, electronic billboards, television and radio channel. Digital marketing is the integral components of all the communication methods and became a success factor in agriculture.

Need of Digital Marketing in Agriculture

Agriculture is the key sector in the nation. Crop production in India has been improved from the green revolution, which is the important weapon to fight against the world hunger to improve the livelihood of people and increase the economic growth. Application of ICT in agriculture will helps in increasing the crop production which leads to economic growth.

Methods used in Digital Marketing

The use of ICT in agriculture has increased over a period of time . The farmers can market their produce through websites, web portals, through mobile services with mobile apps. Mobile services are very cheaper mode of marketing the products by creating mobile

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Apps. The market updates can reach the farmers and consumers in fraction of seconds. With the market updates they can get the products directly from the farmers. No intermediators are required by the use of digital marketing in agriculture.

Conclusion

Agriculture constitutes the major livelihood of the nation. There are several challenges in agricultural marketing. The digital marketing is the great opportunities to the farmers in terms of marketing their produce. Smart phones can even breakthrough the small and medium farmers, where Apps are used for agricultural marketing. Digital Marketing helps the farmers to increase their income.

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MODERN EQUIPMENT AND MACHINE: CLEAN AND SANITIZE THE DAIRY FARM

Article Id: AL202194

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Generally, sanitation aid in control of livestock infectious diseases, as dung and urine is the main harbour for microorganisms like bacteria and virus and ticks and fleas, we need to destroy these organisms to reduce the infection and prevent economic loss. Reducing the contamination of the farm will improve the quality of milk and milk products and also reduce the mortality and morbidity percentage of animals in farm and increase the reproductive performance and fertility.

Dung and urine harbours microorganisms and ticks' and fleas. The bacterial causes were laminitis due to wet surface, mastitis that is highly economical as more than 80 percentage of the farm income from milk production, *Salmonella, E. Coli* and viral infections includes Foot and mouth disease (transmitted by food and water), pseudo cowpox and fungal diseases of Aflatoxicosis, Aspergillosis and tick by *Boophilus* sp. and fleas deteriorate the normal health of animal and causes economic loss like tick infestation causes depreciation of the value of hide and skin and reduction of milk yield by mastitis and reduction in reproduction efficiency by uterine infections. The cost for treatment of infection or disease is also accounts for economic loss.

Some studies said, foot problem like laminitis, cracked hoof is caused by continuous wet floor and poor sanitation, enteric diseases due to improper sanitation and cleaning which is transmitted by contact with contaminated faeces and fomites, mastitis also due to environmental contamination and cowpats acts as a reservoir for S*almonella* or *E. Coli* O157:H7.

Equipments

Broom: Most commonly used in small farms for cleaning the shed. It is made from midrib of the coconut which is dried in sun and hot air oven at the temperature of about 60^0 for 8 hours.

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It is more flexible and lighter which cannot be used for huge amount of dung and can be used for cleaning the floor after removal of manure from the floor by using scrapper or shovel.

Shovel: It has stainless steel scoop attached with the handle made of wood which is used for removal of the manure from the floor and to move the dung from one place of farm to other end of the farm.

Rake: It is also made of stainless steel rods with wooden handle and it used to clean the spilled feed materials outside the manger where the spilled feed can be contaminated with dung or urine of animal.

Dung scoop: Made of stainless-steel with galvanized coating and it resist in rusting, light in weight and easy to use. It is to remove dung manually which can hold about 5 kg of dung.

Dung scrapper: Made of mild steel material with galvanized coating and the handle may be with steel or wood which can be able to adjust the height of the scrapper. It is used to move the dung or manure from one end of the farm to other end of the farm to make the place near the cattle clean.

Shovel

Rake

Dung scoop

Dung scrapper

Spade: Made of mild steel with zinc coated and the handle may be wooden or steel, it is to lift the dung or slurry form the floor and for to push the manure form one place to another place.

The above said equipment of shovel, rake, dung scoop, dung scrapper, spade are labour intensive.

Wheel barrow: The collected dung material is transported to dung dumping tank or manure pit by wheel barrow. It may be double wheeled and also single wheeled, but the single wheel

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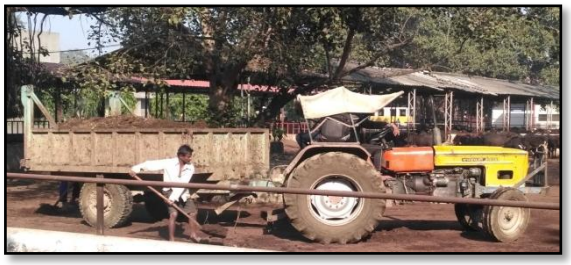
barrow may tumble quickly. Its carrying capacity of the manure is about 100 kg but it is also a labour intensive process in case of large farms.

Tractor trailer: It is for transport of the collected manure form the farm and disposal of it and has a carrying capacity of around 5000 kg. This is easy and quick disposal of manure with less labour requirement.

Flame gun: It is used for sanitation of the farm premises. Flaming material used is kerosene/gasoline/diesel after the pressure applied, the flaming material comes through the discharge box and it is ignited by using match stick or fire. The flame comes out of the discharge box at the pressure of about 16-100 lbs and discharge at the rate of 48.5 feet per second. Flame gun is used on metal frame or cement but not to be used in wood as it is ignited. The flame comes out of the gun is about 500-600 degree Celsius which can destroy all kinds of microorganisms, egg or larvae and external parasites in the floor or wall. Sanitation should be done before the entry of animals into the farm. It can be used inside or outside of the farm house. Flame gun is available in single nozzle or multi nozzle (majorly four).

Wheel barrow



Tractor trailer

Flame gun

Dairy dung cleaning pump: It is to remove the dried dung material from the floor by pressuring the water flow from the nozzle of the hose. It is electrically operated having single phase AC220V, 1.5hp and has 50 m hose. It reduces the wastage of valuable water. About 40 litres per minute passage rate of water used in floor can clean 20 animal shed (i.e., 200 m^2) capacity shed with 300 litres of water. Within 7-8 minutes and in animal about 17 litres per minute can clean an animal with 30 litres of water within 2 minutes. But in normal hose pipe connected directly with water pipe has diameter of about 1 inch will release proportionately large amount of water. It can be used with sanitizer or disinfectant mixed in water.

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Automatic manure scrapper: Components of automatic manure scrapper are motor of 22 KV which can drive two scrappers, scrapper of straight blade or 'V' blade, corner wheel, rope or chain, electrical control. It can be used for rubber floor or slatted floor or concrete floor and the working efficiency is about 95%. There are two driving units one wind the rope and other release at the same time and the driving speed is about 9-10 metre per minute. There are three types of automatic scrapper 1. *Cable driven system* which can use for length of 182 metre and minimal power consumption with low maintenance cost and the mechanism is that the thick steel cable pulls the scrapper so there are no mechanical parts in manure, 2. *Hydraulic drive system* which can use for length of 60-metre-long, it has a power unit connected to a hydraulic cylinder for each alley and a draw moves back and forth moving the scrapper in steps at low speed. It takes long time than cable drive system and used for huge amount of manure load. 3. *Chain scrapper system* has only one moving part resulting in very low maintenance and long life and the scrappers are able to operate in alley with different length. Advantage of automatic manure scrapper is reduction of labour cost, easy to operate, install and maintain reduction of hoof problem and mastitis of the animal by reducing the wet manure form the floor and in rubber flooring wearing loss is less. Disadvantage of the equipment is that over time work causes wear of alley floor and makes slippery, wear of equipment if used on sand and the residue of manure after cleaning the floor by this scrapper is more.

Robotic manure scrapper: It is fully automatic for scrapping dung channel to keep it clean. It can work for about 18-20 hours per day with 4-5 hours for charging at night and has two batteries with 12 V capacities each. It moves with the speed of 9-18 m/min for frequent and log operation during the day time with scrapping capacity of 8,600m^2 and is animal friendly as any obstacles like wall, animal is sensored it changes its direction of movement. The robotic manure scrapper weighs about 500 kg with 100 litre capacity water tank for spraying of water on the floor with dried dung material. The scrapper width is about 180-210 cm. RS is mostly used on slatted floor with slurry manure as it can able to push only 100 kg of manure material. RS has inclined scrapper installed in front of the machine which moves the manure against the floor. Automatic lifting up to 7cm height is provided in scrapper for crossing the passage or gutter. RS is controlled by internet where online programming of when, where and how often to clean is programmed and there is no limit of number of routes. One study stated that, animal increased their movement from lying area to feeding area while

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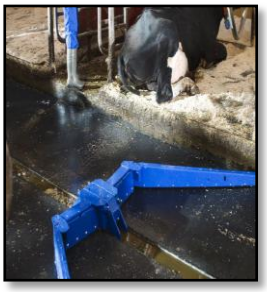
RS operating that increases feed intake. Another study said that, use of RS on floor manure cleaning reduces the emission of methane, carbon dioxide and nitrous oxide but increases the level of ammonia due to left over manure after scrapping.

Gutter cleaner: The manure moved by automatic scrapper or robotic scrapper is collected in gutter which is removed by gutter cleaner to the manure pit. The maximum length of gutter cleaner is about 50m. It works by hydraulic which moves the scrapper back and forth along the length of the gutter. It transport manure and fold them automatically in reverse mode. It helps in cleaning of solid, semisolid or liquid manure from the gutter.

Cleaning pump



Automatic manure scrapper

Robotic manure scrapper

Gutter cleaner

Manure vacuum pump: It is vehicle with scrapper and suction pump at front and carries with a large tank capacity of 2200-4800 gallons. The scrapper width is about 8.5-14 feet which has suction pimp at centre i.e., between the two scrapper blades. The scrapper is adjustable according to the width of the passage. Unloading system (located at front above the scrapper) of the uploaded manure is with capacity of 3000 gallons (1100 litres) in 50 seconds. Flexible turning is available in accordance to the farm. It has a suction pipe of 15 feet long with 3 inches' diameter for suction of slurry form slurry pit and transporting to other places.

Sewage mud pump: The collected slurry is moves to the slurry storage pit or farm field by using sewage mud pump. It works on single phase 1.5 HP to 2 HP and can handle 20 mm to 50 mm solids. It discharges at the rate of 18,000 litres per hour and has 30-40 feet length hose pipe with diameter of 2 or 2.5 inch.

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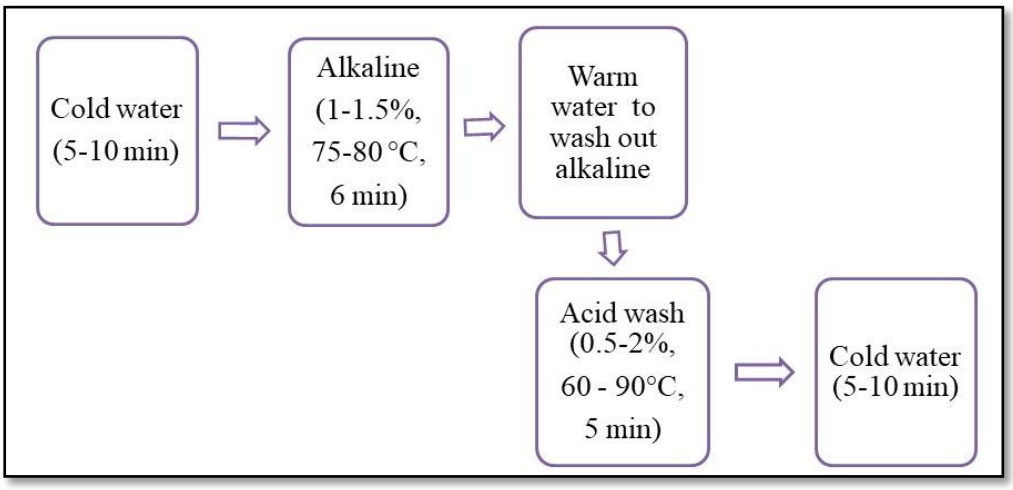
Manure vacuum pump

Sewage mud pump

Turning chain system: Manure which is pushed by the manure scrapper is collected in manure pit that is transported to manure storage area by use of turning chain system. The turning chain can travel at about 16.5 feet/min by a motor of 380V.

Clean In Place (CIP): Most important in dairy farm with milking parlour attached. It is used to clean without dismantling. It is the system of cleaning of the interior surface of pipeline, vessels, processing equipment and associated things without dismantling. It reduces the time of cleaning and is economic. Cleaning depends on character of contamination, application method and speed of penetration. Cleaning solution may be single use or recycled for multiple uses. It removes about 99.9% microbial contamination and elimination of residue of sanitizing agents. High turbulence flow should be given to cleaning solution.



Alkaline solutions are sodium hydroxide (commonly used), potassium hydroxide, and sodium bicarbonate with pH of 7. It saponifies fat and forms into soap which is removed by water. Acidic solutions are nitric acid, hydrochloric acid, citrate, phosphoric acid. It removes the protein and salt by denaturation which is removed by water wash. Sodium hypochlorite

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used can kill gram positive and gram negative microbe.Level of clean is seen by physical removal, chemical and microbiological removal. If unclean, it contaminates milk and makes milk production loss.

Automatic CIP Unit Check Point

1. Milking finished
2. Clusters in position
3. Milk receiver empty
4. Hot water (60-80 degree Celsius)
5. Continuous cold water supply
6. Basic solution
7. Acid solution

Conclusion

In small farms, it is economical to use manual removal methods and in large farms it is economical to use automated equipment's. In rising of the labour problem for past few decades, it has become mandatory for adoption of automatic cleaning system in the large dairy farms Instead of its high initial cost for its implementation. Clean In Place is used as economical cleaning and sanitation aid in milking parlors

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Zizyphus oenoplia Mill.: A SEASONAL WILD EDIBLE FRUIT

Article Id: AL202195

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A number of wild plants used by tribal and rural populations historically.They contribute significantly to their food security and livelihood, as they scientific inquiry and escaped recognition. During periods of natural stress, some wild edible plants and fruits are important constituents of biodiversity, and their exploitation has become a valuable livelihood strategy and fall-back option for rural households. Wild foods and rural household use information has the potential to address food insecurity and can act as a low-cost option in development programs for the poor.Wild species population profiling and protocols standardizing for the propagation of these plant groups could help to conserving the gene pool which has suffered from the ‘tragedy of the commons (Mahapatra and Panda, 2012).

Zizyphus oenoplia Mill

Ayurveda-the knowledge for long life originated in India during the Vedic period. Both Charaka Samhita and Sushruta Samhita are the core of the Ayurvedic medicinal systems, which explains the therapeutic usage of thousands of different types of plants. One such plant mentioned is *Ziziphus oenoplia Mill*. (Shukla *et al*., 2016). *Ziziphus oenoplia (L.) Mill*. belongs to Family Rhamnaceae and is commonly well known as Jackal Jujube in English. It’s a straggling shrub spread all over the temperate regions of India, Pakistan, Sri Lanka, Malaysia, and Tropical Asia. The fruits of the plant are edible and widely used in Ayurveda for the treatment of a number of health problems, such as ulcers, stomach aches, digestive, antiseptic, hepatoprotective, wound healing obesity, asthma and diuretic property (Snehi*et al*., 2020). The flowers are green in colour, in subsessile axillary cymes. The fruits contain a single seed having globose drupe, black and shiny when ripe. It is one of the folk herbal medicines that has some major pharmacological properties as a blood purifier, abdominal pain killer, febrifuge etc.

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Scientific Classification

Kingdom	Plantae
Phylum	Tracheophyta
Class	Magnoliopsida
Order	Rosales
Family	Rhamnaceae
Genus	Ziziphus
Species	Ziziphus oenoplia (L.) Mill.

Mineral Composition

Mineral composition per gram of fruits on dry weight basis was calcium: 0.103mg/g, potassium: 0.023mg/g, magnesium: 0.192mg/g, iron: 0.823mg/g, zinc: 0.067 and phosphorus: 0.025mg/g (Devi *et al*., 2019).

Antioxidant Activity

Fruits are considered to be a rich source of antioxidants. Different solvent extracts of Ziziphus oenoplia fruits identified the presence of phenols, tannins, saponins, alkaloids, flavonoids, phlobatinins, steroids, terpenoids, cardiac glycosides and anthraquinones (Anand and Deborah, 2017). Generally, phenolic content correlates with antioxidant activity for different kinds of fruits. *Ziziphus oenoplia* fruits has phenolic content of 65mg GAE/100g (Devi *et al*., 2019). Among different extracts of the fruit, the highest antioxidant activity was found in Ethanol crude extract with 87.66±1.54% inhibition at a concentration of 640µg/mL, which is comparable to that of standard Ascorbic acid 90.72 ± 0.76% inhibition(Goyal *et al*., 2021).

The leaves of the plant had phenolic content of 57.33 mg, flavonoids-116.19 mg, flavonol-59.77 mg and condensed tannins 287.85 mg. The leaves extract also exhibited significant anthelmintic potentials against aquarium worms (*Tubifex tubifex*) but low cytotoxic activities were observed for the plant extract (Alam *et al*., 2020).

Antidiabetic Activity

Some tropical and subtropical places of Asia, including India, use the fruits of *Z. oenoplia* in the treatment of Diabetes mellitus as folk medicine without any scientific

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evidence. One of the possible approaches to decrease postprandial hyperglycemiais by reducing glucose uptake through the inhibition effect of carbohydrate-hydrolyzing enzymes namely α-glucosidase and α-amylase. In same manner maximum α-amylase and α – glucosidase inhibitory effect shown by ethanol crude extract 88.43 ± 0.58% and 85.2 ± 1.7 % Inhibition at 800 µg/mL respectively, which is comparable to the standard acarbose as reference drug 97.2 ± 0.48 and 99.12± 0.72% Inhibition. In a dose dependent manner extracts of fruit exhibited postprandial hypoglycaemic effect by inhibiting α–amylase, α– glucosidase enzyme(Goyal *et al*., 2021).

Wound healing Activity

Aqueous and alcoholic extracts of fruits of *Z. oenoplia* showed significant wound healing activity, which is comparable to Framycetin sulphate cream as reference standard drug.

The fruits of the plant are good source of vitamin c and helps in improving immunity system. Consumption of these seasonal fruits provides protection against a number of health problems like nutritional deficiencies, diabetes, heart related problems and a number of cancers.

Conclusion

Wild edible plants play an important role in the traditional food system and are also part of the culture. Almost every part of the naturally grown plants was used in history for various purposes like as food, nutrients and as medicine. Among the wild edible plants, *Z. oenoplia*is one of the plants with good nutritional and pharmacological properties. As they are easily available and so can be used by the tribal and rural people of developing countries for different purposes. Lack awareness, decreased availability and chemical composition, many of the naturally available plants are treated as wild or underutilised. More research has to be in this area to provide more scientific evidence for the use of these plants as food and medicine.



Zizyphus oenoplia Mill

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SIGNIFICANCE OF MANAGEMENT PRACTICES OF DAIRY ANIMALS DURING SERVICE PERIOD

Article Id: AL202196

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Service period is defined as the period between calving to successful conception. It takes 30 days for the involution of the uterus and 45 days for the resumption of ovarian cyclicity. 60 days is considered as the voluntary waiting period. Voluntary waiting period is the period where we wait voluntarily for AI to animals and after 60 days we can start breeding of animals. But 85 days is considered optimum for breeding and animals conceive successfully. This is service period and varies from animal to animal and breed to breed. Service period of different breeds are sahiwal (127.53), gir (152.08), Tharparker (156.11), Murrah (156.33), Karan Fries (148.89), Karan Swiss (150.12), Deoni (117), Jersey cross (108) (Annual report NDRI, 2008).

Optimum service period is important as it helps the animal to recover from the stress of calving, reproductive organs back to normal and to maintain the calving interval. Service period should be optimum so that the animal should calve once in a year. If it is too short then Animal will become weakand hence, persistency of milk production decreased. If it is too long then life time production will be reduced.There are many factors which influence the service period of dairy animals which we are going to discuss and different management practices during service period.

Major Problems Contributing To Change in the Service Period

Immediately after calving in 90% of cases animal is very susceptible to uterine contamination which is quite normal and unavoidable. This occurs due to uncoupling of growth hormone and insulin growth factor. At this time due to decrease in growth hormone and insulin animal may fall in negative energy balance. Within 7 days of calving in approx. 40% of cases metritis may occur and this occurs mainly in heifers, animals suffered from dystocia, still birth, twins and retention of foetal membrane. And if metritis is not treated then

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it may complicate the case leading to endometritis, severe loss in body condition score, culling and failure to resume the cyclicity. If animals are properly monitored during this periodfor the above cases then animals may return to positive energy balance in 45 days and breeding may start from 60 days after calving.

Other Managemental Problems Leading To Reduced Fertility & Delay in Pregnancy

If the animals are not coming in estrous then the managemental factors that affects this are inability of farmers to detect heat in animals in time, energy deficient diet leading to negative energy balance which reduces fertility and delay in pregnancy. Other factors are uterine infections, Infected semen, unfavourabel uterine environment due to hormonal deficiencies lead to death of embryo and ultimately increase in service period.

Factors Affecting Service Period and Their Management

1. Nutritional Factors

At peripartum period animals are very susceptible for negative energy balance as there is transition of animal from non lactating pregnant to lactating non pregnant stage. Animal have to sustain milk production and also have to feed its calf. In liver it may lead to decrease in insulin like growth factor, in adipose tissue there will be decrease in leptin hormone, in blood there will be Increase in NEFA, BHBA and Urea concentration. So this negative energy may lead to increased risk of metabolic diseases, decreased immune response and reduction in subsequent fertility by altering the follicular development. And hence lead to increase in service period.

Nutritional management

This negative energy after parturition can be reduced by feeding the animal with higher energy diets, maximizing dry matter intake, adjusting crude & bypass protein level, providing adequate fiber to prevent off feed problems or chronic intake fluctuations, checking macro mineral (Ca, P, Mg, K) levels & water availability. Bayril and coworkers, 2015 have found that supplementation of vitamin E and selenium during dry period have significantly reduced the service period

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Body condition score

Another important factor which affect the service period is the body condition score of animal. Wathes and coworkers, 2007 have found that optimum body condition score for primiparous animals should be 3 whereas crowe, 2008 have found for pleuriparous animal should be between 2.75-3. If BCS is low then animal may take longer to conceive and if it is high then there will be reduced dry matter intake.

2. Physiopathological Factors

Physiopathological factors affecting service period are Clinical mastitis, Lameness, Endometritis, dystocia, RFM, milk fever and caesarean. Dobson and coworkers, 2008 have found that in mastitic and lame cows, a delay in the resumption of cyclicity could add an extra 7 & 17 days, respectively to the calving to conception interval. they found that maximum increase in service period was due to caesarean among the above mentioned diseases.

Management

Various causes that may lead to postpartum diseases are Exposure to bacterial pathogens, Mineral and vitamin deficiencies, Negative energy balance, Immunosuppression. So these factors must be reduced by proper treatment of diseases and preventing the occurrence of diseases by supplementing extra concentrate during dry period and antioxidant.

3. Managemental Factors

Managemental factors that may lead to increase in service period are Infections of postpartum uterus, Deficiency in correct expression of heat signs by animals, Inability of farmers to detect heat in animals in time, Improper technique of AI (Lack of following standard Operating Procedures).

This could be improve by using teaser bull for detection of heat, following am-pm rule, using good quality semen and doing AI technically right.

4. Environmental Factors

Environmental factors that may lead to increase in service period are Air temperature, Relative humidity, solar radiations, Atmospheric pressure and Windspeed.

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Heat stress

Heat stress may lead to reduced appetite & feed intake, negative energy balance, , increased reactive oxygen species, compromised follicular development & mechanism of ovulation, altered insulin, IGF1, T3, T4. Glucose, poor estrous expression, anestrous & prolonged service period. Yadao and co-workers, 2005 have found that there is increase in service period in hot and humid climate as compare to winter and summer dry season.

Heat stress management

This can be done by feedinghigh quality forages & conc., changing feeding times that is feeding during cooler parts that is at night, providing proper ventilation by inreasing air flow and avoid overcrowding and installation of fans & sprinklers

5. Genetic Factors

Since service period is reproductive trait and hence it is low heritable and is mainly controlled by non-genetic factors or environment effects however Appropriate use of genetics can be done by Selective breeding for lameness and mastitis as these may lead to alteration in successful conception of animals.

Conclusion

So in order to get the animal to be conceived at proper time after parturition we can Prevent production diseases, Minimize the negative energy balance by adopting balanced feeding, Keep the animals in stress free environment, Resolve uterine infections by taking timely help of qualified veterinary doctors, Get the services of well-trained AI technicians and Use disease free dose of semen for AI.

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LIVESTOCK AS A DOMINANT ENTERPRISE OF FARMING SYSTEM: A TUG WAR BETWEEN OPPORTUNITY AND ENVIRONMENTAL WELLBEING

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Global livestock production has increased manifold since the recent era of modern conflict (1st and 2nd World War) has ended, and demand for animal-based products has increased. The growth rate is predicted to be sustained in the coming days, too; the continuous increment of real income in developed and developing countries can be taken as the primary driving force. The livestock sector is now accounting for 1.4% of the World's Gross Domestic Product. The most significant achievement we drew from the growth of the livestock sector is fulfilling the per capita protein demand, especially in developed and developing countries, which is now seeping into relatively poorer counters. The animal-based protein created a buffer for such areas where plant-based protein dangles into uncertainty due to harsh climatic conditions, particularly in dry areas. Ifwe look at global statistics, livestock is currently providing food to 1 billion poor people and at the same time responsible for 40% of global agricultural output. Globally approximately 1500-million-hectare land is under livestock/pasture management. In the coming years, livestock will rise to such a stature that it will be providing 50% of global food demand. However, integrating animals in the farming system is different in developing countries from developed countries; in developed countries, livestock farming is a highly specialized, sophisticated stand-alone practice in developing countries; it is more of a part of the integrated system. These family-run integrated systems are responsible for 50% of the worlds meat,90% milk, and 50% cereal production. Moreover, the byproduct material of animal manure is a valuable source of energy and manure, especially in the case of resource-poor farmers.

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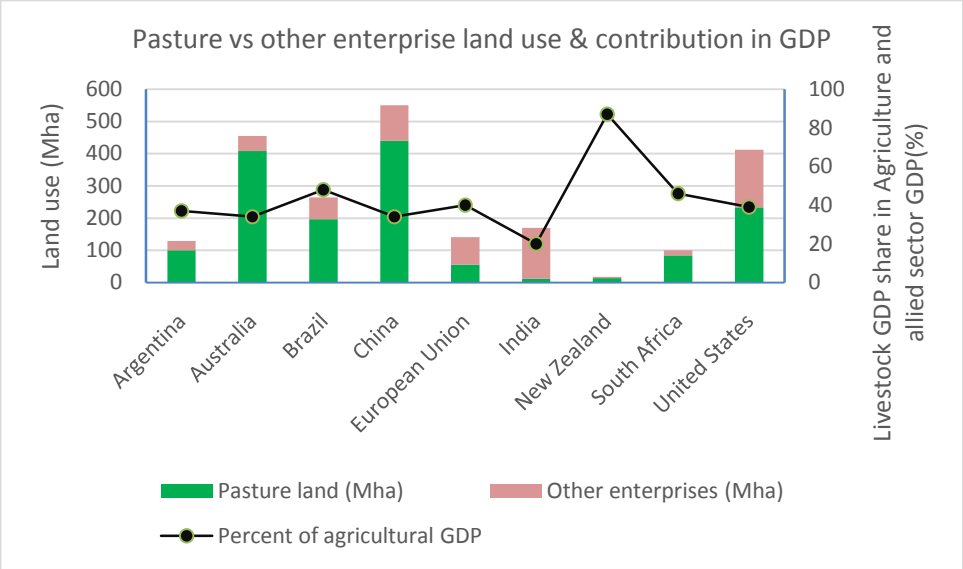

Figure1: Land use by pasture vs other agricultural enterprises and contribution of Livestock GDP in some of the leading countries of livestock production (Source- FAO)

Figure 2: Conversion of Amazon rain forest to grazing land

In the initial days, the growth of the livestock sector was smooth as the land was not a limited resource. However, in recent times land as well as water has become a scarce resource. Apart from resource scarcity, livestock production is also putting substantial pressure on biodiversity conservation. The situation is worsened due to the formidable threat of climate change, especially in developing countries.

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How livestock production can threaten the overall environmental sustainability and hasten climate change, we can cite the example of Brazil. Amazon rainforest is a critical element for global climatic stability, which falls in Brazil. Now, a large portion of the Amazon rain forest is getting destroyed each year and converted to ranch land for livestock grazing. The 70% of Brazilian Amazon rain forest is eventually converted to medium or large size ranch land. In the United States, 55% of the soil erosion and deposition of sediments, 30% of nitrogen and phosphorus loading in waterbodies source back to livestock-related agricultural activities. On a global scale, as livestock production will rise by 115% from 2000 to 2050, simultaneously, it will be responsible foran additional 23% of global N and 54% P circulation, which will ultimately cause air, water and soil pollution. Another projection has shown that 7.1 million tons of greenhouse gas emissions per year will be generated from the livestock sector, accounting for 14.5% of total anthropogenic GHG emissions.

As the demand forlivestock-based products and pollution from the same sector is simultaneously increasing while the supporting resource (land, air and water) is constant, the only way to tackle the scenario is improving resource use efficiency and reducing environmental footprint.

Economic Return and the Consumer Demand of Livestock Sector

The economic aspect of livestock production has two distinct parts. The first part is 2020; it is predicted that a whopping 5 billion people of Asia and Africa will start living in highly dense urban areas, which will lead to tremendous urban growth; however, the same area cannot be used for any production, including livestock. The second part is that the demand of those urban areas will be met by the farmers living in rural areas, the land of whom will be subjected to thrust for producing higher and higher production per unit area. As a result, per capita and unit earning will be much higher. For example, from 1990 to 2000, the demand for meat and milk had been increased by 55% and 20 % respectively in developing countries, which is now predicted to increase by a rate of 30% and 45% by 2030. Thus, the demand for livestock-based products will rise higher every day, especially in developing countries.

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Change of Land Use Pattern Due To Livestock

Livestock production and associated system are Earth's largest land user, holding 30% of the terrestrial landmass. A large part of it is under the subsistence farming system of Asia and Africa. The problem with subsistence farming practice is that it is highly dependent on deforestation; the only way to increase the production in the subsistence farming system is to extend its cultivable area horizontally. Currently, 26% of the global land area is used for grazing while 33% of the crop land is used to produce animal feed. To understand the complexity of land use, we must analyze the world's feed quality and pattern. In developed countries (Such as countries of Europe), animals rearing is specialized and intensive, where animals are feed with highly nutritious feed material. However, in Africa and Asian countries, animals are fed with nutrition deficit food materials or crop residues. As a result, the demand for bulk feed materials can be as high as ten times in resource-poor areas, the primary cause of deforestation and horizontal land expansion. The most resource-poor area on Earth is Sub Saharan Africa, which annually loses 0.3-0.4% of its area to ranching.

Another important aspect is the competitive food support of a particular system. For example, it is seen that a land area of one hectare can feed 19-22 persons when under staple food crops; however, the same amount of land can feed only two persons when under a livestock-based production system. So now, the whole system has to be overhauled to achieve sustainability.

Water Resource and Livestock

Globally livestock sector is one of the significant waters demanding sectors. The total water utilization in livestock rearing is divided into two groups, i.e., upstream and downstream. Upstream activities include growing forage crops, feeding and drinking water for animals while the downstream includes processing livestock derived products such as milk or meat or fur. The entire sector is responsible for 10% of total global anthropogenic water utilization.

In arid and semiarid areas, water is the most critical factor for livestock rearing. However, the water use efficiency in such areas and other areas used for animal production is far less than any other system. On Management per se, the interaction between water bodes and livestock is never taken seriously. The water used for livestock production per unit area

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and on a calorie basis is 30-50 times higher than cereal and root crops. Moreover, the judicious use of water in forage production is often an afterthought.

Impact of Livestock Production System on Land Degradation

Continuous highly mechanized cultivation of the soil for forage production and grazing significantly alters the soil and vegetation. The topsoil often gets loosened up, which results from higher erosion. Soil compaction due to these activities leads to less water infiltration and more runoff. Recent research from countries with high grazing rates points out that the infiltration rate can be reduced up to 80%. In Africa, 50% of land degradation leads to livestock grazing. This is often argued that the grazing land benefits from the animal excreta, which helps enhance the soil nutrient profile; however, higher runoff due to over grazing is asignificant issue. The livestock urine and excreta often get in routed to water bodies due to higher runoff. Another issue is that fodder crops are often not well-fertilized like food crops lead to soil exhaustion, especially in developing countries.

Conclusion

There is no doubt that livestock plays a significant role in modern agriculture and the food system. However, sustainability in livestock production is a burning issue and maybe much more complex than other agriculture enterprises. On one end, livestock is feeding a massive population of the developing world and providing a higher source of income while on the other hand possessing a more significant threat to the environment through several factors. Therefore, it is high time for the agronomist, resource managers, ecologists to engage in collaborative research, development and guidance initiatives to address the issue.

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