

## Review

# Prevalence and Chemotherapy of Lice Infestation in Bovines

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## ABSTRACT

This paper reviews the studies on the prevalence and chemotherapeutic control of lice infestation in cattle and buffaloes. Sucking lice are the most common ectoparasites of cattle and buffaloes. There are several factors both environmental and host, which contribute to lice infestation, e.g. poor nutrition, intensity of sunlight, temperature, humidity, crowding, management conditions, host-skin reaction, hair condition, hair length and shedding, animal grooming, licking, physiological resistance, breeds, etc. Lice have been reported to transmit infectious and non-infectious diseases. In addition, they also cause hemtological and biochemical disturbances in the host. A variety of chemicals including trichlorophon (Neguvon), deltamethrin, flumethrin, ivermectin, doramectin, moxidectin, eprinomectin, abamectin, malathion, chlorinated hydrocarbons, cyhalothrin, cypermethrin, neguvon and tiguvoon have been used for the control of lice in cattle and buffaloes. Among the insecticide and antiparasitics, ivermectin has been found to have maximum control over the infestation. Further, research in this area may explore other chemical and immunobiological methods to control lice infestation in animals.

**Key Words:** Lice; Cattle; Buffaloes; Prevalence; Chemotherapeutic Control

## INTRODUCTION

Ectoparasites including lice, ticks, mites etc. play an important role in the transmission of certain pathogens (Ali, 1983; Loomis, 1986) but unfortunately they have not attracted proper attention of the veterinarians of our country. The ectoparasites are known to cause heavy economic losses to livestock industry due to their usual habit of blood sucking, which adversely affects the economic production (Fujusaki *et al.*, 1993; Branscheid & Schroer, 1997).

Pediculosis in cattle occurs throughout the world, and is more common in cattle than in any other domestic animal (Urquhart, 1987) and is associated with the blood loss (Shemanchuk *et al.*, 1963; Butler, 1985). Cattle lice are unable to survive for more than few days off their host (Matthysse, 1946; Wall & Shearer, 1997), therefore, result in a continuous drain on animal production. Lice infestation has been reported to cause weight loss up to 25-30 kg (Scharff, 1962; Nickel, 1971; Cummins & Graham, 1982; Fadok, 1984; Gibney *et al.*, 1985; Loomis, 1986), reduced calf birth weights (Khan & Schaalje, 1985) and 15-25% per animal per year decrease in the milk production (Fadok, 1984; Marchand, 1984; Loomis, 1986). The lice infested animals loose their conditions and production rapidly. In addition, lice infestation contributes to huge economic losses due to damage to skin and hide (Tancouse, 1986) in the form of light flecks and spots followed by secondary bacterial infection or scratching behaviour and inflammation of the skin (Nickel, 1971; Oormazdi & Baker, 1974; Steelman, 1976; Cummins & Tweedle 1977; Baker & Oormazdi, 1978; Oormazdi & Bakar, 1980; Butler, 1985;

Webster & Bugby, 1990; Bugby *et al.*, 1990; Nafstad & Gronstol, 2001b; 2001c). Lice infested animals keep poor physical condition and develop an unthrifty, anemic appearance and discoloured greasy hair (Scharff, 1962, Utech *et al.*, 1969; Nelson *et al.*, 1970; Meleney, 1978; Nelson, 1984). Louse free animals have been reported to be more profitable than infested animals due to increased rate of weight gain and more feed utilization (Collins & Dewhirst, 1965; Kettle, 1974).

**Prevalence.** There are number of lice species infesting cattle and buffaloes. These include *Haematopinus eurysternus* (Matthysse, 1946; Kemper *et al.*, 1948; Snipes, 1948; Peterson *et al.*, 1953; Haufe & Thompson, 1960; Collins & Dewhirst, 1965; Iqbal, 1971; Nickle, 1971; Titchener, 1983; Douglas *et al.*, 2001; Nofstad & Gronstol, 2001a), *Haematopinus tuberculatus* (Meleney & Kim, 1974; Rawat *et al.*, 1992), *Haematopinus quadripertusus* (Gabaj *et al.*, 1993), *Solenoptes capillatus* (Titchener, 1983; Milnes & Green, 1999; Colwell *et al.*, 2001), *Damalinia bovis* (Charmers & Charleston, 1980c; Titchener, 1983), *Linognathus vituli* (Scharff, 1962; Kettle, 1974; Charmers & Charleston, 1980c; Titchener, 1983; George *et al.*, 1992; Nofstad & Gronstol, 2001a; Colwell *et al.*, 2002), and *Bovicola bovis* (Geden *et al.*, 1990; Utech *et al.*, 1999). The mixed infestations of *Haematopinus quadripertusus* and *L. vituli* (Gabaj *et al.*, 1993), *Bovicola bovis* and *L. vituli* (Scharff, 1962; Kettle, 1974; Oormazdi & Baker, 1980; Gibney *et al.*, 1985; Nafstad, 1998, Nafstad & Gronstol, 2001a), *L. vituli* and *Damalinia bovis* (Titchener, 1983), *Haematopinus eurysternus*, *L. vituli*, *Bovicola bovis* and *Solenopotes capillatus* (Craufurd-Benson, 1941a; Scharff,

1992; Chalmers & Charleston, 1980b; Christensen, 1982; Yeruham *et al.*, 1982; Titchener, 1983; Geden *et al.*, 1990; Nafstad, 1997; Kamyszek, 1997; Metenawy *et al.*, 1997; Topgu, 1999; Milnes & Green, 1999; Nafstad & Gronstol, 2001b) has also been reported. The studies on the physiological effects of lice on cattle indicated that the heavily infested animals had a low erythrocyte numbers and hemoglobin ratios, both of which are indicative of anemia (Smith & Richards, 1955; Haufe, 1962; Scharff, 1962; Collins & Dewhirst, 1965; Freer & Gahan, 1968; Nickel *et al.*, 1970). The factors contributing towards fluctuations in the lice infestation include nutrition, intensity of sunlight, temperature, humidity, crowding, host-skin reaction, hair condition, hair length and shedding, animal grooming, licking and physiological resistance of individual animals and breeds (Imes, 1940; Craufurd-Benson, 1941a; Matthyse, 1946; Lancaster, 1957; Lewis & Christenson, 1962; Jenson & Roberts, 1966; Ely & Harvey, 1969). The effect of lice infestation in cattle receiving high level of nutrition is significantly reduced (Ely & Harvey, 1969; Gibney *et al.*, 1985) as a low protein diet for host animals breaks down their resistance, which allows parasite numbers to increase (Nelson, 1984). Regarding the seasonal distribution of lice infestation changes throughout the year, the population of sucking lice reaches its highest level in late winter and early spring (Imes, 1918, Matthysee, 1946; Lancaster & Roberts, 1957; Gojmerac, 1959; Scharff, 1962; Kettle, 1974; Chalmers & Charleston, 1980b; Callcott & French, 1988; Geden *et al.*, 1990) while that of the biting cattle louse (*Bovicola bovis*) reaches the peak level of infestation during late January and early February and low in summer (Imes, 1940; Craufurd-Benson, 1941b; Gojmerac *et al.*, 1959; Jenson & Roberts, 1966). *L. vituli* infestation in cattle was declined at the end of winter due to improvement of weather conditions (Drummond *et al.*, 1988). It has been reviewed that lice have particularly severe effect on their host in the cold weather and at the time of nutritional stress in winter due to malnutritional feed (Roberts, 1952; Seddon, 1967). Lice infestation varies with different breeds of cattle and buffaloes. It is high in Holstein, Fresian cattle and low in Jersey (Shull, 1932; Gojmerac *et al.*, 1959). All the breeds of cattle susceptible to louse infestation and none of the breed of cattle have been found to be immune to lice infestation (Babcock & Cushing, 1942; Matthyse, 1946). Age is also important factor for lice infestation. Young animals are more heavily infested than older cattle (Mock, 1974; Chalmers & Charleston, 1980a; Kennedy & Kralka, 1986; Milnes & Green, 1999). Although there is non-significant relation between the lice infestation and the coat colour (Craufurd-Benson, 1941; Chalmers & Charleston, 1980b) but the white areas on the skin are preferred by lice because they are cooler (Chalmers & Charleston, 1980b). Studies on the effect of coat composition on the lice infestation show a non significant correlation of louse numbers with hair diameter, relative proportion of red and

black hairs, hair and debris weight and a significant correlation was found between louse number and sample sites (Chalmers & Charleston, 1980b). Management factors also contribute in the prevalence of lice infestation in cattle indicating a significantly lower prevalence in free stalled animals as compared to stationed cattle (Geden *et al.*, 1990; Nafstad, 1998). Moreover, an artificial weekly grooming of the animals also reduces the prevalence of lice infestation (Nafstad, 1998).

**Chemotherapy.** A number of antiparasitic drugs are used for the control of biting and sucking lice in cattle and buffaloes. These include ivermectin (Hoston, 1982; Barth, 1983; Leaning, 1984; Barth & Preston, 1985; Marriner, 1986; Ryan & Guerrero, 1987; Titchener *et al.*, 1994; Shoop *et al.*, 1996; Titchener & Purnell, 1996; Clymer *et al.*, 1998; Polley *et al.*, 1998; Islam *et al.*, 1998; Hossen & Mostofa, 1999; Clymer *et al.*, 2000; Campbell *et al.*, 2001), Doramectin (Rooney *et al.*, 1999; Logan *et al.*, 1993; Lloyd *et al.*, 1996; Phillips *et al.*, 1996; Villeneuve & Diagnealut, 1997; Skogerbone *et al.*, 2000), Eprinomectin (Shoop *et al.*, 1996), Moxidectin (Chick *et al.*, 1993; Titchener *et al.*, 1994; Losson & Lonneux, 1996; Colwell, 2002), Abamectin (Heinz-Mutz *et al.*, 1993; Titchener *et al.*, 1994), Pyrethroids (Titchener, 1985; Stendel & Leverkusen, 1988; Webster & Bugby, 1990; Rothwell *et al.*, 1999; Campbell *et al.*, 2001; Nafstad & Gronstol, 2001a; Gupta *et al.*, 2002), Neguvon (Knapp, 1965; Campbell *et al.*, 1978; Lau *et al.*, 1980), Tiguvon (Matthyse *et al.*, 1967; Nickel, 1971), Coumaphos (Knapp, 1965; Matthyse *et al.*, 1967; Khan, 1995), Carbaryl (Matthyse *et al.*, 1967; Savchenko *et al.*, 1972), Phosmet (Kettle, 1981; Titchener, 1985), Diazinon (Motholland, 1964; Freer & Gahan, 1968; Campbell *et al.*, 1998; Matthyse *et al.*, 1967), Chlorinated hydrocarbons (Lancaster, 1951; Kemper & Peterson, 1953; Smith & Richards, 1955; Anthony, 1959), malathion (Anthony *et al.*, 1963), flumethrin (Nafstad & Gronstol, 2001a; Losson & Lonneux, 1992). Pour on preparations of moxidectin provide persistent activity against *B. bovis* and *L. vituli* for 42 days post treatment (Colwell, 2002). In one studies, persistent activity of doramectin against *L. vituli* has been reported 105 days (Skogerboe *et al.*, 2000). Injectable ivermectin against *L. vituli* had a 14 days activity and doramectin had 35 days activity (Titchener & Purnell, 1996). Against *B. bovis*, the persistent activity of ivermectin and doramectin has been reported as 49 days (Clymer *et al.*, 1998) and 77 days (Skogerboe *et al.*, 2000), respectively. A single treatment of cypermethrin or cyhalothrin has been reported to have a complete control over the lice infesting cattle in U.K. (Titchener, 1985). Among these drugs, ivermectin has been found for having a persistent efficacy against biting louse up to seven weeks after treatment (Clymer *et al.*, 1998). In response to treatment of louse-infected animals, a significant effect in weight gain has been reported (Snipes, 1948; Collins & Dewhirst, 1965).

## CONCLUSION

The review has indicated that a wide variety of lice species infest bovines, which adversely affect the productivity of the animals. The drugs used for the control and treatment of lice are gradually losing their efficacy due to development of resistance in addition to having public health hazards. Therefore, alternate control based on either new compounds and/or organic agents is to be researched.

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