UK Vet Equine

Literature Review Approaching the Future Management of Sweet Itch

--Manuscript Draft--

Manuscript Number:	ukve.2022.0006
Full Title:	Literature Review Approaching the Future Management of Sweet Itch
Short Title:	
Article Type:	Clinical review
Keywords:	Equine; Sweet Itch; Insect Bite Hypersensitivity; Horse; Allergy
Corresponding Author:	Ben Malaki Curnow, BVSc MSc FHEA MRCVS University of Liverpool Liverpool, Wirral UNITED KINGDOM
Corresponding Author Secondary Information:	
Corresponding Author's Institution:	University of Liverpool
Corresponding Author's Secondary Institution:	
First Author:	Ben Curnow, BVSc MSc FHEA MRCVS
First Author Secondary Information:	
Order of Authors:	Ben Curnow, BVSc MSc FHEA MRCVS
	Iona Darroch, BVSc MRCVS
Order of Authors Secondary Information:	
Abstract:	Insect bite hypersensitivity (IBH), commonly known as sweet itch, continues to prove frustrating to manage in practice. IBH is the most common allergic skin disease of horses, characterised as a hypersensitivity to the salivary proteins of the Culicodes genus of insects. The complex nature of this allergic disease means that no set of affected horses can be managed in the same way. Common approaches to sweet itch can be broken down into the categories of anti-inflammatories, allergen avoidance, skin conditioning, and immunotherapy. Many effective management techniques focus on the avoidance of insect bites, and regular washing of the skin. Current advances are being made towards effective immunotherapy, with varied results in clinical trials and in practice. As a result of this, a multimodal approach to the management of IBH is often recommended.
Suggested Reviewers:	Janet Littlewood Veterinary Dermatology Specialist, Veterinary Practitioner janet.littlewood@vetdermdoc.co.uk Janet is a leading specialist in the field of equine dermatology. She has lectured and published extensively on the topic.
Additional Information:	
Question	**Response**
Please enter the **word count** of your manuscript	1754

Literature Review

Approaching the Future Management of Sweet Itch

B. Curnow [a, *, 1], I. Darroch [a, 1]

[a] *Department of Equine Clinical Science, University of Liverpool, Leahurst Campus, Neston, United Kingdom, CH64 7TE.*

* Corresponding author. Tel.: +44 151 794 6199.

E-mail address: benc@liv.ac.uk (B. Curnow).

[1] Both authors contributed equally to the work of this publication.

Word Count: 1754

Abstract

Insect bite hypersensitivity (IBH), commonly known as sweet itch, continues to prove frustrating to manage in practice. IBH is the most common allergic skin disease of horses, characterised as a hypersensitivity to the salivary proteins of the *Culicodes* genus of insects. The complex nature of this allergic disease means that no set of affected horses can be managed in the same way. Common approaches to sweet itch can be broken down into the categories of anti-inflammatories, allergen avoidance, skin conditioning, and immunotherapy. Many effective management techniques focus on the avoidance of insect bites, and regular washing of the skin. Current advances are being made towards effective immunotherapy, with varied results in clinical trials and in practice. As a result of this, a multimodal approach to the management of IBH is often recommended.

Keywords: Equine; Sweet Itch; Insect Bite Hypersensitivity; Horse; Allergy

Introduction

Insect bite hypersensitivity (IBH) is the most common allergic skin disease of horses, causing a localised pruritus to the feeding sites of the biting midge (Scott and Miller, 2011; Schaffartzik et al., 2012) (*Figures* 1 and 2). The seasonal nature of this disease has been attributed to the biting insects of the genus *Culicoides*, which are traditionally associated with dry warm days between the spring and autumn in the UK (Meiswinkel et al., 2000; Van Grevenhof et al., 2007). Midge breeding sites tend to congregate around densely wooded areas, or those that harbour stagnant water, which can lead to increased numbers of biting insects (Carpenter et al., 2008). However, the prevalence of IBH is also subject to considerable variations depending on the breed and, even more so, on family lineage (Littlewood, 1998; Van Grevenhof et al., 2007).

It is important that we gain an effective understanding of the pathogenesis of IBH at a cellular level. Avoiding allergens may seem a sensible suggestion, but the consequences of climate change means that it is becoming ever more difficult to evade the *Culicoides* midges. As it stands, a total of 27 salivary gland proteins have been identified as causative allergens in IBH (Novotny et al., 2021). Therefore, our management of this condition is going to likely require a greater understanding of targets within the cellular allergic response. The phenotype of IBH is predominated by a Type I hypersensitivity reaction in which allergen-specific T cells with a Th2-like cytokine profile and specific IgE are involved (Schaffartzik et al., 2012). There is also a noted role of IL-4 and IL-13 (Jonsdottir et al., 2019), and in the latter phase of Type 1 hypersensitivities, TH2-derived IL-5 will trigger an eosinophilia (Larché et al., 2006). IL-31 is also derived from Th2 cells and is integral in the manifestation of allergic pruritus via interactions with receptors on the dorsal root ganglia within the skin (Sonkoly et al., 2006).

Delayed hypersensitivities (Type 4) are also characterised by IL-5 producing TH2 cells and eosinophilia, which has led to some interpretation of IBH as a combination of Type 1 and Type 4 hypersensitivity (Kurotaki et al., 1994). However, this is difficult to discern as separate from chronic and repeated inflammatory changes which ultimately lead to eosinophils as the predominant cell type associated with IBH.

Approaches to managing IBH can be divided into four categories: allergen avoidance, skin integrity, anti-inflammatories, and immunotherapy.

Allergen Avoidance

Although many different approaches for treatment of IBH have been described, the most effective method is the avoidance of *Culicoides* allergens. Avoidance or reduced allergen exposure is commonly achieved attempted by covering the skin with rugs (Olsen et al., 2010). Anecdotally, it would seem the most effective of these rugs is the Boett® Sweet Itch Blanket, but this is also by far the most expensive. Beside these rugs, horses can be stabled from mid- afternoon to mid-morning (Nelson and Bellamy, 1971), or even relocated to other parts of the country if the owners are dedicated. Regions with lower insect populations tend to be near the seaside, or sometimes higher altitudes, providing dense heathered and woody areas are avoided. Mosquito netting can be used to seal stable doors and windows to minimize *Culicoides* entry into the stable environment (Baker et al., 2015; Lincoln et al., 2015).

Insect repellents are also applied readily by owners, with variable results. Topical cypermethrin is the only scientifically reported pour-on to partially protect against biting flies as exposure can kill midges if exposed for at least 3 minutes (Papadopoulos et al., 2010).

Whether this is enough time before an insect-bite results in clinical signs remains to be determined. Some essential oils, such as lemon grass extract, has been proven to be repellent in laboratory studies, and have been considered an alternative to chemical compounds (Baldacchino et al., 2013; Gonzalez et al., 2014).

Skin Integrity

Allergic reactions result in inflammation and pruritus, which will lead to trauma and subsequent compromise to the skin integrity. Although skin health is not necessarily an impenetrable barrier to the bite of *Culicoides* midges, there is certainly evidence that topical emollients and in-feed supplementation can aid in reducing clinical signs of IBH.

Omega fatty acids 3 and 6 are approved in the treatment of canine atopic dermatitis (Müller et al., 2004; Olivry et al., 2010), and while they are thought to help stabilise the epidermal lipid barrier (Hansen and Jensen, 1985), there is good evidence that they are an aid in suppression of enzymes integral to the inflammatory cascade (Vaughn et al., 1994).

Considering these findings, a study by O'Neill et al. (2002) suggested some benefit in using flaxseed oil to mitigate the skin test response to *Culicoides* extract from hypersensitive horses. Although this is encouraging, Friberg and Logas (1999) found that linseed oil supplementation had no effect on the level of pruritus observed between the control and experimental groups. Given that beneficial effects have only been seen at doses of 1g/Kg, the cost of oil volume required can hinder their use in horses and ponies, especially those predisposed to equine metabolic syndrome.

There is only one recent study that showed topical creams to be useful for resolving lesions incurred by IBH, but pruritus remained unaffected in the horses, and some had adverse reactions to the emollient (Humann and Muller, 2019). Topical essential oils have also shown some promise with regards to improving skin lesions and pruritic scores in a small group of

horses (Cox et al., 2020), but a commercial essential oil product can prove difficult and expensive to source at the correct concentration.

Despite the lacking scientific evidence, consensus across many veterinarians is that regular shampooing can be one of the most beneficial tools with regards to soothing skin and repairing the skin barrier (Table 1). Owner compliance is the mediating factor in the success of this therapy.

Anti-inflammatories

The primary focus of controlling the inflammatory process of IBH is often through the use of corticosteroids, but other pharmaceutical preparations are available to help in management of the disease.

Topical steroids in the form of creams or sprays are rarely effective as a sole treatment, but when used with insect avoidance and management changes, they can help avoid the need for systemic steroids, or reduce the systemic dose if used in conjunction with oral steroids. No topical steroid products are licensed for use in horses (Table 2), but there are many preparations available for use in small animal allergic skin disease. These topical products can become costly and inefficient for treatment of large areas of affected skin.

Antihistamines can be of some use as a sole treatment, but have been shown to work best as a preventative due to histamine having a greater effect in the initial phases of IBH. Therefore, antihistamines should ideally be given prior to exposure to *Culicoides* allergens (Marsella, 2013). There are no licenced antihistamine formulations for horses, so there is a wide range of doses available (Table 3). Moreover, a recent study has shown that cetirizine has no benefit in the treatment of IBH (Olsén et al., 2011). The use of antihistamines in combination with corticosteroids could be effective at reducing the systemic steroid dose while effectively managing pruritis associated with IBH.

For cases where pruritis and self-trauma associated with IBH cannot be controlled with topical therapy and antihistamines, systemic medication with corticosteroids can be implemented. Injectable therapy is often suitable initially for acute pruritic episodes, but this is rarely practical in the long term (Mora Pereira et al., 2018). Oral corticosteroid treatment could be safer, though care should still be taken in horses with susceptibility to laminitis, and once clinical remission is achieved the aim should be to reduce the dose to the lowest effective maintenance dose to limit the risk of undesirable side effects.

Immunotherapy

Despite the popular use of allergen specific immunotherapy (ASIT) in horses with atopy, this has not translated into treatment of IBH. The trials exploring ASIT use in horses with IBH used whole body extract sourced from midges that were unfamiliar to the horses' environment (Barbet et al., 1990; Anderson et al., 1996; Ginel et al., 2014). At best, the results of these studies are weak positive, and do not always account for improved environmental control during the experiment. The identification of pure salivary gland proteins from various *Culicoides* species are integral to successful ASIT in horses with IBH. It is important to remember that the aim of ASIT is to stimulate an appropriate Th1/Treg cell type response, as opposed to a Th2 type response. This is the possible basis behind the anecdotal success of Insol® Dermatophyton (Boehringer Ingleheim) ringworm vaccine. Despite a lack in statistically significant clinical improvement, one study did demonstrate increased inflammatory markers indicative of a Th1/Treg cell type response (Gehlen at al., 2016). It would seem that, until a more specific form of ASIT becomes available, the use of commercial Insol® Dermatophyton may be appropriate as long as owners are made aware of its off-licence use and cost of import. Two injections (1ml) are given intramuscularly,

approximately 4 weeks apart prior to the start of the sweet-itch season. This can be followed by booster injections every 6 months-1 year.

On an experimental level, there are some exciting advances with regards to the targeting of interleukins that are integral to the inflammatory process involved in IBH. The use of Lokivetmab (Cytopoint, Zoetis) is now commonplace in the treatment of canine atopic dermatitis following successful double blinded placebo control trials (Michels et al., 2016; Moyaert et al., 2017). This is a dose-dependent monoclonal antibody designed to target IL-31. Trials to produce an equine equivalent have started, first providing evidence of a role for IL-31 in IBH, and then stating improved clinical scores of patients following treatment (Olomski et al., 2020).

Attempts are also being made to produce an active immune response against IL-5. The carefully formulated vaccine was found to initially reduce peripheral eosinophil counts, and consequently improved clinical symptoms in the second year of vaccination (Fettelschoss-Gabriel et al., 2019). The same authors have attempted to utilise the same active vaccination technology to produce an IL-31 vaccine for a small group of chronically pruritic horses (Fettelschoss et al., 2021) with some positive results, albeit without a control group.

Conclusion

Although many management methods remain the same, our understanding of IBH is ever improving. With greater knowledge of the immunopathogenesis of this debilitating disease comes an ability to tackle new targets in the inflammatory and allergic process.

Conflicts of interest

The authors have no conflicts of interest to declare.

References

Anderson GS, Belton P, Jahren E, Lange H, Kleider N. 1996. Immunotherapy trial for horses in British Columbia with Culicoides (Diptera:Ceratopogonidae) hypersensitivity. J Med Entomol. 33(3):458–66

Baker, T., Carpenter, S., Gubbins, S., Newton, R., Lo Iacono, G., Wood, J. and Harrup, L.E., 2015. Can insecticide-treated netting provide protection for Equids from Culicoides biting midges in the United Kingdom?. Para Vect 8(1) 1-17.

Baldacchino, F., Tramut, C., Salem, A., Liénard, E., Delétré, E., Franc, M., Martin, T., Duvallet, G. and Jay-Robert, P., 2013. The repellency of lemongrass oil against stable flies, tested using video tracking. Parasite, 20.

Barbet JL, Bevier D, Greiner EC. Specific immunotherapy in the treatment of Culicoides hypersensitive horses: a double-blind study. 1990. Equine Vet J. 22(4):232–5.

Carpenter, S., Mellor, P.S. and Torr, S.J., 2008. Control techniques for Culicoides biting midges and their application in the UK and northwestern Palaearctic. Med. Vet. Entomol., 22(3); 175-187.

Cox, A., Wood, K., Coleman, G., Stewart, A.J., Bertin, F.R., Owen, H., Suen, W.W. and Medina- Torres, C.E., 2020. Essential oil spray reduces clinical signs of insect bite hypersensitivity in horses. Aus Vet J, 98(8) 411-416.

Fettelschoss-Gabriel A, Fettelschoss V, Olomski F, Birkmann K, Thoms F, Buhler M, Kummer, M., Zeltins, A., Kündig, T.M. and Bachmann, M.F. 2019. Active vaccination

against interleukin- 5 as long-term treatment for insect-bite hypersensitivity in horses. Allergy. 74(3):572–82.

Fettelschoss, V., Olomski, F., Birkmann, K., Kündig, T.M., Bergvall, K. and Fettelschoss-Gabriel, A., 2021. Interleukin 31 and targeted vaccination in a case series of six horses with chronic pruritus. Eq Vet Ed, 33(12) e490-e500.

Friberg, C.A. and Logas, D.A.W.N., 1999. Treatment of culicoides hypersensitive horses with high-dose n-3 fatty acids: a double-blinded crossover study. Vet Derm 10(2) 117-122

Gehlen H, Brunner M, Klier J, Reese S. Therapy of summer eczema using Insol® Dermatophyton - a field study. 2016 Pferdeheilkunde Equine Med. 32(4):306-315

Ginel PJ, Hernandez E, Lucena R, Blanco B, Novales M, Mozos E. Allergen-specific immunotherapy in horses with insect bite hyper- sensitivity: a double-blind, randomized, placebo-controlled study. 2014. Vet Dermatol. 25(1) 29–e10

González, M., Venter, G.J., López, S., Iturrondobeitia, J.C. and Goldarazena, A., 2014. Laboratory and field evaluations of chemical and plant- derived potential repellents against Culicoides biting midges in northern S pain. Med Vet Ent 28(4) 421-431.

Jonsdottir, S., Cvitas, I., Svansson, V., Fettelschloss-Gabriel, A., Torsteinsdottir, S. and Marti, E., 2019. New strategies for prevention and treatment of insect bite hypersensitivity in horses. Cur Derm Rep, 8(4), 303-312.

Kurotaki T, Narayama K, Oyamada T, Yoshikawa H, Yoshikawa T., 1994. Immunopathological study on equine insect hypersensitivity (“kasen”) in Japan. J Comp Pathol 110(2):145–52.

Larché, M., Akdis, C.A. and Valenta, R., 2006. Immunological mechanisms of allergen-specific immunotherapy. Nat Rev Imm 6(10) 761-771.

Littlewood, J.D., 1998. Incidence of recurrent seasonal pruritus ('sweet itch') in British and German shire horses. Vet Rec, 142 (3); 66-67.

Lincoln, V.J., Page, P.C., Kopp, C., Mathis, A., Von Niederhäusern, R., Burger, D. and Hansen, H.S. and Jensen, B., 1985. Essential function of linoleic acid esterified in acylglucosylceramide and acylceramide in maintaining the epidermal water permeability barrier. Evidence from feeding studies with oleate, linoleate, arachidonate, columbinate and α-linolenate. Lip Lip Metabol 834(3) 357-363.

Herholz, C., 2015. Protection of horses against Culicoides biting midges in different housing systems in Switzerland. Vet Parasi 210(3-4) 206-214.

Marsella, R. 2013 ‘Equine Allergy Therapy - Update on the treatment of environmental, insect bite hypersensitivity and food allergies’ Vet Clin N Am: Eq Pra 29 (3) 551-557

Meiswinkel, R., Baylis, M. and Labuschagne, K., 2000, Stabling and the protection of horses from *Culicoides bolitinos* (*Diptera: Ceratopogonidae*), a recently identified vector of African horse sickness. Bull. entomol. Res. 90, 509-515.

Michels GM, Ramsey DS, Walsh KF. et al. A blinded, random- ized, placebo-controlled, dose determination trial of lokivetmab (ZTS-00103289), a caninized, anti-canine IL-31 monoclonal anti- body in client owned dogs with atopic dermatitis. Vet Dermatol 2016; 27: 478–e129.

Mora Pereira, M., Groover, E., Wooldridge, A., Caldwell, F. 2018 'Review of glucocorticoid therapy in horses. Part 2: Clinical use of systemic glucocorticoids in horses' Eq Vet Ed 30 (4) 213-224

Moyaert, H., Van Brussel, L., Borowski, S., Escalada, M., Mahabir, S.P., Walters, R.R. and Stegemann, M.R., 2017. A blinded, randomized clinical trial evaluating the efficacy and safety of lokivetmab compared to ciclosporin in client- owned dogs with atopic dermatitis. Vet Dermatol 28(6) 93-e145.

Müller, M.R., Linek, M., Löwenstein, C., Röthig, A., Doucette, K., Thorstensen, K. and Mueller, R.S., 2016. Evaluation of cyclosporine-sparing effects of polyunsaturated fatty acids in the treatment of canine atopic dermatitis. Vet J 210 77-81.

Nelson, R.L. and Bellamy, R.E., 1971. Patterns of flight activity of Culicoides variipennis (Coquillett)(Diptera: Ceratopogonidae). J Med Ent 8(3) 283-291.

Olomski, F., Fettelschoss, V., Jonsdottir, S., Birkmann, K., Thoms, F., Marti, E., Bachmann, M.F., Kündig, T.M. and Fettelschoss- Gabriel, A., 2020. Interleukin 31 in insect bite

hypersensitivity—Alleviating clinical symptoms by active vaccination against itch. Allergy, 75(4) 862-871.

Olsén, L., Bondesson, U., Broström, H., Olsson, U., Mazogi, B., Sundqvist, M., Tjälve, H., Ingvast-Larsson, C. 2011 'Pharmacokinetics and effects of cetirizine in horses with insect bite hypersensitivity.' Vet J 187(3) 347-51

O'Neill, W., McKee, S. and Clarke, A.F., 2002. Flaxseed (Linum usitatissimum) supplementation associated with reduced skin test lesional area in horses with Culicoides hypersensitivity. Can J Vet Res, 66(4), 272.

Novotny, E.N., White, S.J., Wilson, A.D., Stefánsdóttir, S.B., Tijhaar, E., Jonsdóttir, S., Frey, R., Reiche, D., Rose, H., Rhyner, C. and Schüpbach- Regula, G., 2021. Component-resolved microarray analysis of IgE sensitization profiles to Culicoides recombinant allergens in horses with insect bite hypersensitivity. All. 76(4) 1147-1157.

Olivry, T., DeBoer, D.J., Favrot, C., Jackson, H.A., Mueller, R.S., Nuttall, T., Prélaud, P. and International Task Force on Canine Atopic Dermatitis, 2010. Treatment of canine atopic dermatitis: 2010 clinical practice guidelines from the International Task Force on Canine Atopic Dermatitis. Vet Derm. 21(3) 233-248.

Scott DW, Miller WH. Equine Dermatology, 2nd edition. Mary- land Heights, MO: Saunders Elsevier, 2011; 263–313.

Schaffartzik, A., Hamza, E., Janda, J., Crameri, R., Marti, E. and Rhyner, C., 2012. Equine insect bite hypersensitivity: what do we know?. Vet Immunol Immunopathol 147(3-4); 113-126.

Sonkoly, E., Muller, A., Lauerma, A.I., Pivarcsi, A., Soto, H., Kemeny, L., Alenius, H., Dieu-Nosjean, M.C., Meller, S., Rieker, J. and Steinhoff, M., 2006. IL-31: a new link between T cells and pruritus in atopic skin inflammation. J All Clin Imm, 117(2) 411-417.

Van Grevenhof, E.M., Ducro, B., Heuven, H.C.M. and Bijma, P., 2007. Identification of environmental factors affecting the prevalence of insect bite hypersensitivity in Shetland ponies and Friesian horses in the Netherlands. Equ Vet J, 39(1); 69-73.

Vaughn, D.M., Reinhardt, G.A., Swaim, S.F., Lauten, S.D., Garner, C.A., Boudreaux, M.K., Spano, J.S., Hoffman, C.E. and Conner, B., 1994. Evaluation of effects of dietary n-6 to n-3 fatty acid ratios on leukotriene B synthesis in dog skin and neutrophils. Vet Derm, 5(4), 163-173.

Figure Legends

Figure 1 a) The mane of a pony that has suffered from chronic IBH. Note the shortening of the hairs and the dull brittle nature hair ends. **b)** The tail of the same pony. The hairs are almost absent here, giving the pony a ‘rat-tail’ appearance.

Figure 2 a) The ear tip of a pony that has been suffering from chronic IBH. The skin is alopecic, thickened, a keratinised. **b)** The undercarriage of the same pony. The sheath and ventrum are also thickened and alopecic, as a consequence of the pony having been rubbing its belly on the ground.

Key Points

- The sweet itch ‘season’ is becoming broader due to changes in climate.
- Our understanding of the immunopathogenesis is still developing, but the presence of IgE and eosinophils is consistent across all models.
- It is important to tackle the symptoms of sweet itch with a multimodal approach: allergen avoidance, skin integrity, anti-inflammatories, and immunotherapy.
- Pharmacological therapeutics have not changed for many years. A multimodal approach using corticosteroids and antihistamines can be attempted, but is not always effective.
- Scientific advances are happening in the field of immunotherapy, targeting IL-31 and IL-5. These have proven successful in small animal medicine.

Figure 1a

Click here to download Figure (i.e. diagram, illustration, photo) Figure 1a.jpg

Figure 1b

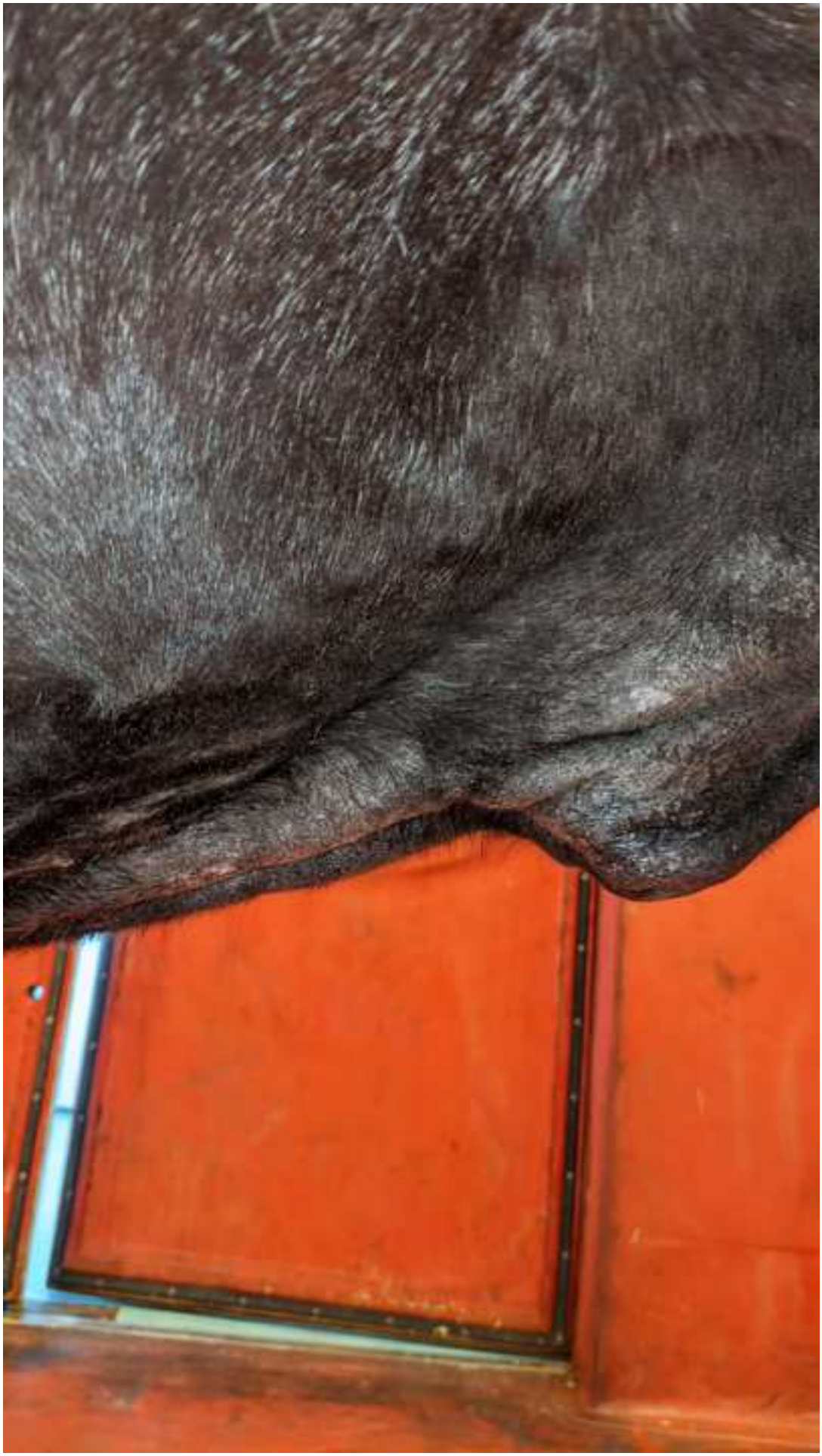
Click here to download Figure (i.e. diagram, illustration, photo) Figure 1b.jpg

Figure 2a

Click here to download Figure (i.e. diagram, illustration, photo)
Figure 2a.jpg

Figure 2b

Click here to download Figure (i.e. diagram, illustration, photo)
figure 2b.jpg



Topical Product	Primary Base	Mode of Action	Frequency of Application
Coatex (VetPlus)	Oatmeal Shampoo	- Cooling - Antipruritic - Moisturising - Cleanse Hair and Skin	Bath once-twice weekly
Episooth (Virbac)	Oatmeal Shampoo	- Cooling - Antipruritic - Moisturising - Cleanse Hair and Skin	Bath once-twice weekly
DermAllay (Dechra)	Oatmeal Shampoo	- Cooling - Antipruritic - Moisturising - Cleanse Hair and Skin	Bath once-twice weekly
Skin So Soft (Avon)	Jojoba Oil Conditioner	- Insect Repellent - Antipruritic - Moisturising	Apply to affected areas once daily

Table 1: Examples of common shampoos and conditioners utilised to aid in improving skin integrity for horses and ponies suffering from IBH and other allergic skin diseases. Unfortunately, no commercial essential oil product exists on the market that is equivalent to that used by Cox et al. (2020).

Topical Corticosteroid	**Commercial Formulation**
Hydrocortisone	*Cortavance Cutaneous Spray (Virbac)*
Triamcinolone	*Dermanolon Cutaneous Spray (Dechra)*
Betamethasone	*Isaderm cream (Dechra)* *Betnovate cream (GSK)* *Betafuse cream (Norbrook)*

Table 2: Listed formulations of topical corticosteroids that can be applied to localised areas of pruritus.

	Drug	**Dose**	**Frequency**	**Trade name**
Corticosteroids	Prednisolone	1mg/kg PO	SID	*EquiPred (Virbac)* *Equisolon (Dechra)*
	Dexamethasone PO	0.01-0.1mg/kg	SID/EOD	*Dexadreson (MSD Animal Health)* *Colvasone (Norbrook)* *Rapidexon (Dechra)* *Duphacort Q (Zoeitis*
	Dexamethasone IV	0.01-0.1mg/kg	SID	
Antihistamines	Chlorpheniramine	0.2-0.5mg/kg PO	BID/TID	*Piriton (GSK)*
	Hydroxyzine hydrochloride	0.25-1.5mg/kg PO	BID/TID	*Atarax (GSK)*

Table 3: Listed corticosteroids and antihistamines with associated dose ranges, frequency of administration, and commercial products available.