

IMMUNISATION OF PREGNANT COWS AGAINST RINGWORM AND ITS EFFECT ON THE PROGENY

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Abstract

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The topic of the study was the development of immunity and its possible transmission to progeny in pregnant cows vaccinated against ringworm. Twelve experimental pregnant cows were vaccinated twice against ringworm and another twelve cows served as non-vaccinated controls. Calves born by the experimental and the control cows were challenged epicutaneously with a virulent strain of *Trichophyton verrucosum*. The experimental cows were challenged with the same agent ten months after the second vaccination. The challenge resulted in mycotic lesions that were less severe and healed sooner in the vaccinated than in the control cows. No difference in the clinical course of ringworm induced by challenge were observed between the calves born by the experimental and the control cows. It is concluded that pregnant cows vaccinated against ringworm developed immunity which was not transmitted to their progeny. The vaccination had no effect on pregnancy, parturition and the state of health of newborn calves. The results were not processed by statistical methods.

Immunisation, Trichophyton verrucosum, pregnant cows

The effects of vaccination of late pregnant cows against ringworm using the Russian vaccines TF-130 and LTF-130 on the state of health of the vaccinates and newborn calves and on the course of pregnancy were studied by Jilavjan et al. (1976). However, the authors did not investigate the development of immunity and its possible transfer to the progeny.

Materials and Methods

Our experiment was conducted in Holstein cows in a herd that had been free of ringworm for the last ten years. The cows had never been vaccinated against ringworm.

Twelve cows aged two to eight years were vaccinated intramuscularly in the gluteal region with 5 ml of a live commercial vaccine against ringworm (Trichoben, Bioveta, Ivanovice na Hané, Czech Republic); six of them were vaccinated on pregnancy day 113 to 190 and the remaining six on pregnancy day 191 to 212. The vaccination with the same dose in the opposite gluteal region was repeated after twelve days.

Another twelve cows served as non-vaccinated controls. All the cows were monitored for the course of pregnancy and parturition and for the state of health of newborn calves. The calves were left with their dams for two days to assure sufficient intake of colostrum. All calves born by the vaccinated and the control cows were challenged epicutaneously with a virulent strain of *T. verrucosum* at the age of 26 to 72 days. The challenge dose of 5×10^6 CFU was rubbed into a 10×10 cm area of shaved and scarified epidermis on the right side.

Both the vaccinated and the control cows were challenged in the same way ten months after the second vaccination.

The development of skin lesions at the challenge site in the calves and cows was monitored for 43 and 34 days, respectively. Samples of flakes, crusts or hair for inoculation onto Sabouraud agar supplemented with chloramphenicol and actidion were collected from the lesions towards the end of the observation period.

Results

No undesirable local or general post-vaccination reactions were observed in the vaccinated cows. The vaccination had no adverse effects on pregnancy or parturition. No

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differences in the state of health and physical condition were found between the calves born by the vaccinated and the control cows. The challenged calves developed cutaneous mycotic lesions in the form of crusts on a bleeding base covering more than one half of the inoculated area (Table 1). The same clinical picture was observed in the non-vaccinated challenged cows. The lesions persisted up to the end of the observation period and the challenge strain was re-isolated from all the clinically positive calves and cows.

Table 1
Results of experimental *T. verrucosum* infection of calves born to vaccinated or non-vaccinated cows

Experimental Group	Number of calves	Score of skin lesions on post-inoculation day – number of calves																			
		13. day after inoculation					21. day after inoculation					32. day after inoculation					43. day after inoculation				
		-	±	+	++	+++	-	±	+	++	+++	-	±	+	++	+++	-	±	+	++	+++
Calves of vaccinated cows	12	3	7	2	0	0	0	0	0	2	10	0	0	0	4	8	0	0	6	5	1
Calves of non-vaccinated cows	12	2	7	3	0	0	0	0	0	2	10	0	0	0	5	7	0	0	7	4	1

Scoring scheme

- without apparent mycotic skin lesions
- ± small mycotic skin lesions (scales, papulae)
- + solitary mycotic lesions
- ++ mycotic lesions covering over 1/3 to 1/2 of the inoculated skin area
- +++ mycotic lesions covering over more than 1/2 of the inoculated skin area

Challenge in the vaccinated cows resulted in the development of less severe and transient lesions that released spontaneously after about 14 days. All the animals were clinically normal and the infection site was covered by hair at the end of the observation period (Table 2). Examination by culture done at this time yielded negative results.

Table 2
Efficacy tests of the vaccine TRICHOBEN in cows immunised during pregnancy

Experimental Group	Number of calves	Score of skin lesions in the site of application of <i>T. verrucosum</i> culture, number of cows																			
		13. day after inoculation					20. day after inoculation					28. day after inoculation					34. day after inoculation				
		-	±	+	++	+++	-	±	+	++	+++	-	±	+	++	+++	-	±	+	++	+++
Vaccinated cows	12	0	5	4	3	0	0	4	5	3	0	5	6	1	0	0	12	0	0	0	0
Non-vaccinated cows	12	4	6	2	0	0	0	0	0	5	7	0	0	0	4	8	0	0	4	5	3

For explanation, see Table 1.

Discussion

As demonstrated by more than thirty-years' experience, vaccination has proved to be the most effective method of ringworm control in cattle (Sarkisov and Kolesnikov 1989). It has been demonstrated experimentally that double vaccination induces long-lasting protective immunity against ringworm (Rybníkář et al. 1991; Sarkisov et al. 1997).

Results of challenge of the vaccinated cows done ten months after the vaccination confirmed the good prophylactic efficacy of the vaccine Trichoben. The protective effect looks like better in calves than in older cows. All cows vaccinated at the age of two to eight years developed after challenge mild skin lesions that healed spontaneously within 14 days, while only smaller and rapidly healing lesions were observed in vaccinated calves rather

sporadically (Rybníkář et al. 1991; 1993). In this regard the stage of pregnancy of the cows must be considered, because, generally, weaker immune responses in pregnant females cannot be ruled out.

No transfer of immunity against ringworm from vaccinated cows to progeny was expected, nevertheless, we wanted to test this assumption experimentally. The severity of skin lesions induced by challenge with a virulent culture of *T. verrucosum* was the same in calves born by the vaccinated and the non-vaccinated cows. This finding applied also to the cows vaccinated in the last trimester of pregnancy, i.e. at a stage when bovine foetuses are capable of immune responses to some specific antigens (Toman 2000).

Cell-mediated immunity is known to play the major role in the defence against dermatophytoses (Weigl 1987) and the same is true also for the immunisation with live ringworm vaccines (Gudding and Lund 1995). Further focused experiments would be necessary to explain the association between this fact and our results.

Within the range of 26 to 72 days, neither the course nor the severity of ringworm induced by experimental infection of calves were age-dependent. A similar result was obtained in our earlier study (Rybníkář et al. 1993).

Like Jilavjan et al. (1976), we have demonstrated that vaccination of pregnant cows against ringworm does not pose any threat to foetuses. On the basis of our many years' experience gained in laboratory and field experiments we recommend that the vaccination of calves against ringworm should not be postponed beyond the 3rd week of age.

Vakcinace březích krav proti trichofytóze, otázky vzniku imunity

Cílem práce bylo zjistit, zda u krav vakcinovaných v době březosti proti trichofytóze vzniká imunita, která se přenáší na potomstvo.

Dvanáct březích krav bylo dvakrát vakcinováno živou vakcínou proti trichofytóze, dalších 12 březích krav bylo ponecháno bez vakcinace jako kontroly. Telata narozená od vakcinovaných i nevakcinovaných krav byla epikutánně infikovaná virulentním kmenem *T. verrucosum*. Po deseti měsících od revakcinace byla provedena rovněž čelenž krav stejným infekčním agens.

U vakcinovaných krav došlo po čelenži ke vzniku méně výrazných časově omezených mykotických změn než u nevakcinovaných kontrol. Průběh experimentální trichofytózy u telat od nevakcinovaných i vakcinovaných krav byl stejný.

U krav vakcinovaných v době březosti proti trichofytóze došlo ke vzniku imunity prokazatelné čelenžním testem. Imunita se na telata od imunizovaných krav nepřenesla. Průběh březosti, porod a zdravotní stav novorozených telat nebyly vakcinací negativně ovlivněny. Výsledky nebyly statisticky hodnoceny.

References

- GUDDING, R., LUND, A. 1995: Immunoprophylaxis of bovine dermatophytosis. *Can. Vet. J.* **36**: 302–306
- JILAVJAN, K. A., NIKIFOROV, L. I., PETROVICH, S. V., MARININ, E. A., MAKARCHENKO, V. A., KUSNETSOVA, R. P. 1976: Vlijanije protivotrichofitinoj vakcinacii na tečenije stelnosti u korov. *Bjul. Vses. ord. Lenina inst. eksper. vet.* **25**: 28–29
- RYBNIKÁŘ, A., CHUMELA, J., VRZAL, V., KRUPKA, V. 1991: Immunity in cattle vaccinated against ringworm. *Mycoses* **34**: 433–436
- RYBNIKÁŘ, A., VRZAL, V., CHUMELA, J. 1993: Vaccination of young calves against trichophytosis. *Acta vet. Brno* **62**: 55–61
- SARKISOV, A. K., KOLESNIKOV, A. Y. 1989: Osnovnyje puti iskorenenija dermatomikozov. *Veterinarija (Moskva)* **12**: 36–38
- SARKISOV, A. K., KOROMYSLOV, G. F., OBDIJENKO, N. P., GOLOVINA, N. P. 1997: Primenenije vakcin protiv dermatomikozov životnych. *Veterinarija (Moskva)* **6**: 13–15
- TOMAN, M. 2000: Veterinární imunologie. Grada 413 p.
- WEIGL, E. 1987: Immunology in dermatophytoses. *Čs. Epidem.* **36**: 308–319