Recent developments in the diagnosis of NTTAT infections in domestic animals

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Diagnosis of NTTAT: challenges

- Often low parasite load in body fluids and tissues
- Variety of trypanosome taxa and strains
- Diversity of host species
- Market failure
- Treatment cheaper than diagnosis
- OIE recommended tests not readily available

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=> no validated serological or molecular diagnostic test exists

Tests from commercial companies

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- **CEVA Santé Animale**, France
  - Rapid tests for detecting Abs against *T. vivax* and *T. congolense*
  - Evaluations going on in Africa (Cameroon, Benin)
  - Creates awareness about AAT prophylaxis in cattle breeders

Tests from commercial companies

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Research paper

Development of a rapid antibody test for point-of-care diagnosis of animal African trypanosomosis

Alain Boulangé [a, b], Davita Pillay [c], Cyrille Chevtzoff [d], Nicolas Biteau [c], Vanessa Comé de Graça [b], Leonie Rempeters [e], Dimitrios Theodoridis [e], Théo Baltz [c]

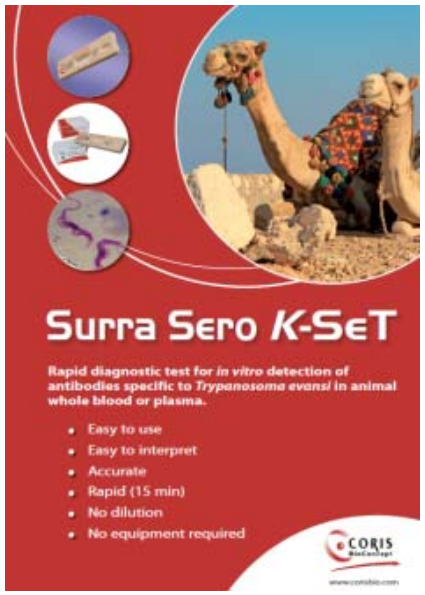
"The prototype, which includes both antigens, shows a specificity of 95.9 (95% C.I., 90.4%–100%) and a sensitivity of 92.0% (95% C.I., 85.9%–98.1%) for *T. congolense* and 98.2% (95% C.I., 94.7%–100%) for *T. vivax*. "

Tests from commercial companies

- **MV Diagnostics**, United Kingdom
  - Collaborates with Enfer Scientific to develop multiplex diagnostic ELISA test
  - Collaborates with the OIE Reference Laboratory for Surra at ITM
  - **Watt *et al*. Multiplex detection of camel antibodies to *Trypanosoma evans*i, Paratuberculosis, Tuberculosis , *Chlamydia abortus*, Dromedary Camel Coronavirus and Caseous Lymphadenitis,** 3rd international scientific conference of camel research and production, 12-23 Nov 2017 Khartoum, Sudan

Tests from commercial companies

- **Coris BioConcept**, Belgium
  - Surra Sero-K-SeT
  - Rapid test for detecting Abs against *T. evansi*
  - First generation: rRoTat 1.2 in *Pichia pastoris*
  - Next generation: rRoTat 1.2 and ISG75 in *Leishmania tarentolae*
  - Collaboration with
    - OIE Reference Laboratory for Surra at ITM
    - University of Kent



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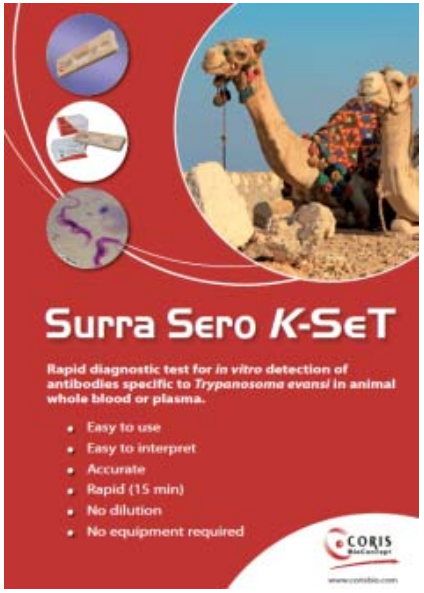
production stopped



Tests recently developed or used by research groups

Serological tests

T. vivax	*T. evansi*	*T. equiperdum*
Native antigen preparations		
Uzcanga et al. 2016 Cattle VSG of *T. equiperdum* ELISA, LATEX agglutionation	Sivajothi et al. 2016 Cattle Whole cell lysate of local strain ELISA	Davasuuren et al. 2017 Horse Crude lysate of local strain ELISA
	Ligi et al. 2016 Cattle, buffalo, camel, equine Flagellar pocket antigens inhibition ELISA	
	Da Silva et al. 2016 Capybara Fixed cells IFAT, CATT	
Recombinant antigens		
	Kumar et al. 2016 Equines HSP70 ELISA	Davaasuren et al. 2017 Horse GM6 ELISA, ICT
	Rudramurthy et al. 2017 Cattle, buffalo, camel, equine ISG-75 inhibition ELISA	

Molecular tests

T. vivax	*T. evansi*	*T. equiperdum*
Garcia et al. 2017 Water buffalo TviCatL-PCR		Suganuma et al. 2016 Horse ITS-PCR
Vieira et al. 2017 Cattle 18SrRNA-PCR	Paoletta et al. 2017 Cattle 18SrRNA-RLB hybrid.	
Mossaad et al. 2017 Camel ITS1-, TviCatL-PCR	Camel ITS1-, RoTat 1.2-PCR	
Ramírez-Iglesias et al. 2017 Cattle ITS1-PCR	Cattle ITS1-PCR	
Rodrigues et al. 2017 Cape buffalo, Wildebeest, nyala, giraf, cattle, goat, sheep, horse, water buffalo, sheep, donkey, tsetse gGAPDH, TviCatL, ITS1, ITS2, 5,8SrRNA-PCRPCR		
Bastos et al. 2017 Cattle TviCatL-PCR		

OIE manuals recommended tests

- **Parasitological**
  Giemsa stained blood smear, heamatocrit centrifugation technique
- **Serological**
  - *T. vivax*: ELISA using soluble antigens from whole cell lysates , IFAT
    Problem: trypanosome strain not defined
  - *T. equiperdum*: complement fixation test
    Problem: trypanosome strain not defined
  - *T. evansi*: CATT/*T. evansi,* immune trypanolysis
    Problem: *T. evansi* type B not recognised
- **Molecular**
  - *T. vivax*-specific satellite DNA-PCR
  - *T. equiperdum* and *T. evansi*: Trypanozoon-specific satellite DNA-PCR

Conclusion

- **Commercial tests for NTTAT almost non-existing**
  - CATT/*T.evansi* (ITM) for surra
  - VerYDiag (CEVA) for *T. congolense* and *T. vivax*
- **Variety of "in-house" serological and molecular tests**
- **Lack of formal evaluation of diagnostic tests**
- **Can OIE play a role in promoting diagnostic research?**

Thank you for your attention