

Untersuchungen zum Vorkommen von Batai-Virus in Wiederkäuern in Deutschland

U. Ziegler¹, M. Eiden¹, F. Press¹, C. Fast¹, B. Gehrman², W. Gaede², J. Borgwardt²,
P. Wysocki³, M.H. Groschup¹



- 1) Friedrich-Loeffler- Institut, Institute für neue und neuartige Tierseuchenerreger, Greifswald-Insel Riems
- 2) Landesamt für Verbraucherschutz Sachsen-Anhalt, Fachbereich 4 Veterinärmedizin, Stendal
- 3) Friedrich-Loeffler- Institut, Institute für Epidemiologie, Greifswald-Insel Riems



seit 1910

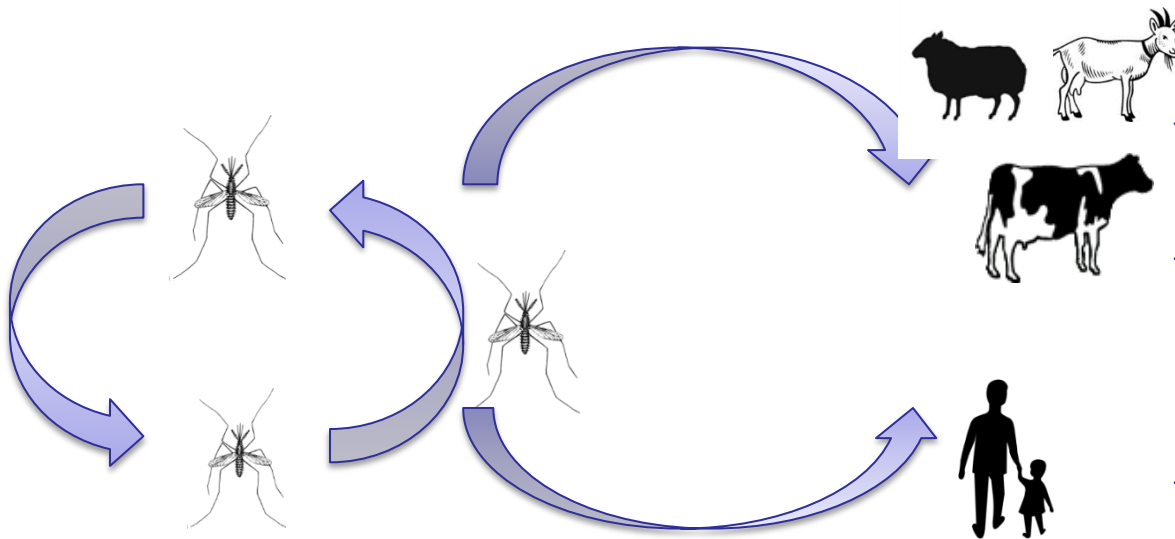
FRIEDRICH-LOEFFLER-INSTITUT

FLI

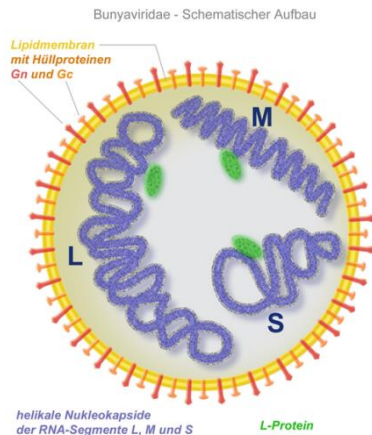
Bundesforschungsinstitut für Tiergesundheit
Federal Research Institute for Animal Health

Batai Virus (BATV)

„domestic animal = mosquito-cycle“



- Säuger-Wirte: Schwein, Pferd, Wiederkäuer
- möglich milde Klinik in Schaf und Ziege
- Rinder keine Zeichen von Symptomen oder Klinik
- Human: grippe-ähnliche Symptome oder i.d.R. symptomlos



Virusfamilie:
Ordnung:
Genus:
Species:

Peribunyaviridae
Bunyavirales
Orhobunyavirus
Batai orthobunyavirus

ICTV Online (10th) Report (2017)

Batai-Virus in Baden-Württemberg:

Am. J. Trop. Med. Hyg., 84(2), 2011, pp. 241–243
doi:10.4269/ajtmh.2011.10-0483
Copyright © 2011 by The American Society of Tropical Medicine and Hygiene

Short Report: Isolation and Phylogenetic Analysis of Batai Virus, Germany

Hanna Jöst, Alexandra Bialonski, Christel Schmetz, Stephan Günther, Norbert Becker, and Jonas Schmidt-Chanasit*
German Mosquito Control Association, Waldsee, Germany; Department of Virology, Bernhard Nocht Institute for Tropical Medicine, Hamburg, Germany

Abstract. A molecular survey including 16,057 mosquitoes captured in Southwest Germany during the summer of 2009 showed the presence of Batai virus (BATV) in *Anopheles maculipennis* sensu lato. Until this survey, there was no evidence for circulation of BATV in Germany. Analysis of partial S, M, and L segments showed that the sequences from all three segments were most closely related to BATV, indicating that the virus has not undergone reassortment. Phylogenetic analysis revealed a close relationship of the isolated BATV strain from Germany with strains from Slovakia, Ukraine, and Russia.



- BATV in 2009 und 2012 in Moskitos
- Virusisolierung (HQ455791)



Surveillance of Batai Virus in Bovines from Germany

Miriam Hofmann,^a Anke Wiethölter,^b Irena Blaha,^c Hanna Jöst,^{a,d} Patrick Heinemann,^{a,e} Maria Lehmann,^a Thomas Miller,^c Daniel Cadar,^a Tohru Yanase,^f Nils Kley,^b Martin Eiden,^b Martin Groschup,^b Jonas Schmidt-Chanasit^{a,d}

Bernhard Nocht Institute for Tropical Medicine, WHO Collaborating Centre for Arbovirus and Hemorrhagic Fever Reference and Research, Hamburg, Germany^a; Friedrich-Loeffler-Institut, Institute for Novel and Emerging Infectious Diseases, Greifswald, Germany^b; Staatliches Tierärztliches Untersuchungsamt-Diagnostikzentrum, Aulendorf, Germany^c; German Centre for Infection Research (DZIF), Hamburg-Luebeck-Borstel partner site, Hamburg, Germany^d; Charité Medical School, Institute of Medical Virology, Berlin, Germany^e; Kyushu Research Station, National Institute of Animal Health, NARO, Kagoshima, Japan^f

To estimate the veterinary importance of Batai virus (BATV), we investigated the presence of BATV-specific antibodies and BATV RNA in 548 bovines from southwest Germany, and we demonstrated that 3 cattle serum samples contained BATV-neutralizing antibodies, resulting in a seroprevalence of 0.55%. Thus, our results confirm local transmission and indicate cattle as potential hosts of BATV in southwest Germany.



- Raum Karlsruhe (2011 und 2012)
Untersuchung von 548 gesunden Rindern
- BATV-RNA negativ
- BATV-Ak 3 pos./548
(0,55% Seroprävalenz)

Clinical and Vaccine Immunology, June 2015, Volume 22 Number 6

Bilder: <https://de.wikipedia.org/wiki/>



FRIEDRICH-LOEFFLER-INSTITUT

seit 1910

FLI

Bundesforschungsinstitut für Tiergesundheit
Federal Research Institute for Animal Health



Batai-Virus- Untersuchungen

(CuliFo = Pathogenprävalenz)

aus anderem FLI-Projekt =
Ziegenplasmen aus den Jahren
2013 bis 2015 aus unterschiedlichen
Bundesländern zur Verfügung

	BW		ST		TH		SN		BB		NI	
Jahr	Herden	Tiere insg.	Herden	Tiere insg.	Herden	Tiere insg.	Herden	Tiere insg.	Herden	Tiere insg.	Herden	Tiere insg.
2013	3	69	-	-	16	181	3	29	13	158	1	22
2014	-	-	12	129	6	34	3	52	-	-	7	49
2015	6	81	-	-	8	44	4	88	-	-	-	-
alle 3 Jahre	9	150	12	129	30	259	10	169	13	158	10	71

= 936 Plasmaproben



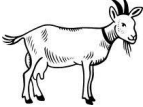
FRIEDRICH-LOEFFLER-INSTITUT

seit 1910

FLI

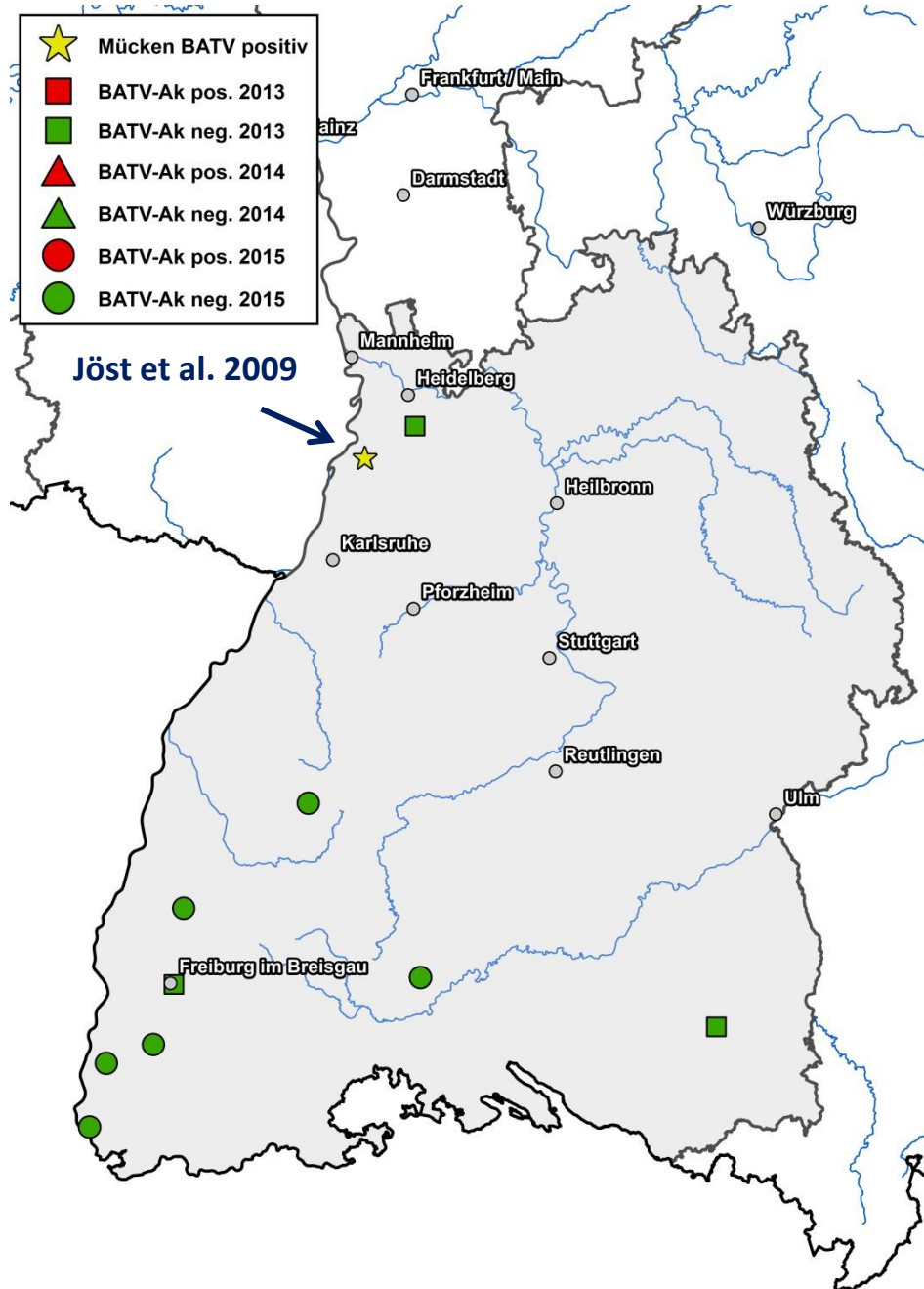
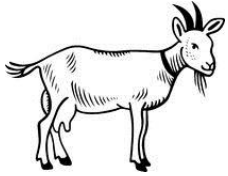
Bundesforschungsinstitut für Tiergesundheit
Federal Research Institute for Animal Health

Batai-Virus Untersuchungen in Baden-Württemberg

 2013	Herden_Nummer	untersuchte Tiere	davon BATV-Ak positiv	davon BATV-Ak negativ	
	15	20	0	20	0 / 69
	25	20	0	20	
	26	29	0	29	
Summe aller Tiere in 3 Herden		69			
2015	122	5	0	5	0 / 81
	123	14	0	14	
	124	19	0	19	
	128	10	0	10	
	129	13	0	13	
	131	20	0	20	
Summe aller Tiere in 6 Herden		81			

insg. 150 Tiere → BATV – AG und Ak – negativ

Baden-Württemberg




Batai-Virus Untersuchungen in Sachsen-Anhalt

Batai-Virus Nachweis in Moskitos/ entomologische AG Dr. Kampen am FLI (Scheuch et al. 2018)

- **Mittlere Elbe** (Raum Wittenberg/Seegrehna) **im Juli und August 2013**
- **Salzlandkreis** (Raum Schönebeck/Elbe) **im August 2013**



Jahr	Herden_N ummer	untersuchte Tiere	davon Batai-Virus			
			positiv (qRT-PCR in BC)	davon BATV-Ak positiv (SNT)	davon BATV-Ak negativ (SNT)	
 2014	65	20	0	0	20	0/20
	66	18	0	10	8	10/18
	67	6	0	5	1	5/6
	68	13	0	4	9	4/13
	69	2	0	0	2	0/2
	70	14	0	14	0	14/14
	71	6	0	1	5	1/6
	74	10	0	0	10	0/10
	76	11	0	0	11	0/11
	77	10	0	0	10	0/10
	78	12	0	12	0	12/12
	79	7	0	4	3	4/7
Summe aller Tiere in 12 Herden:		129				50/129



38,8 %

Seroprävalenz

insg. 129 Tiere → **BATV – AG– alle negativ, BATV-Ak 50 positiv**



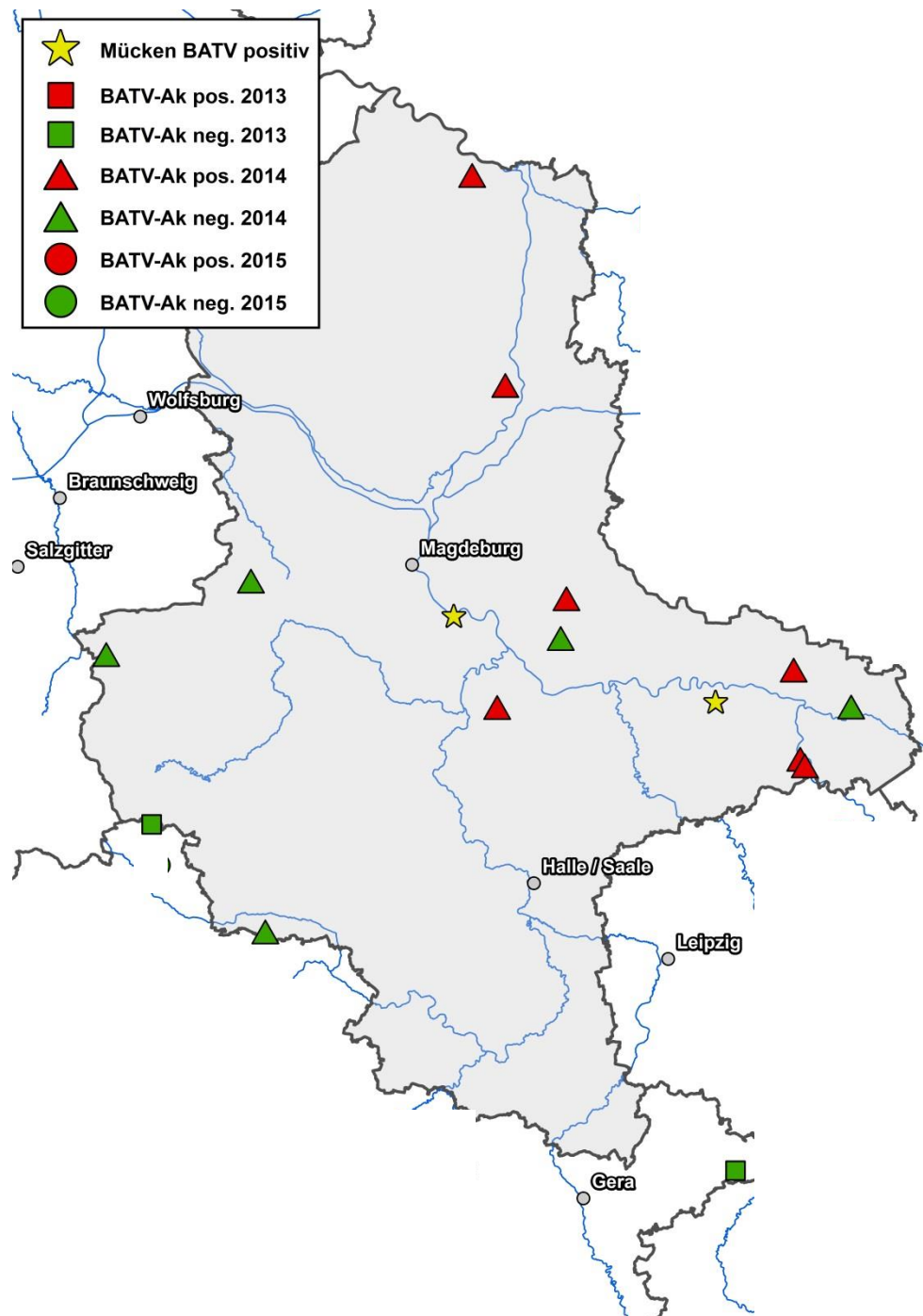
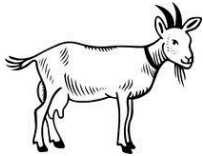
FRIEDRICH-LOEFFLER-INSTITUT

seit 1910

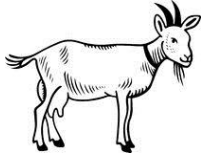
FLI

Bundesforschungsinstitut für Tiergesundheit
Federal Research Institute for Animal Health

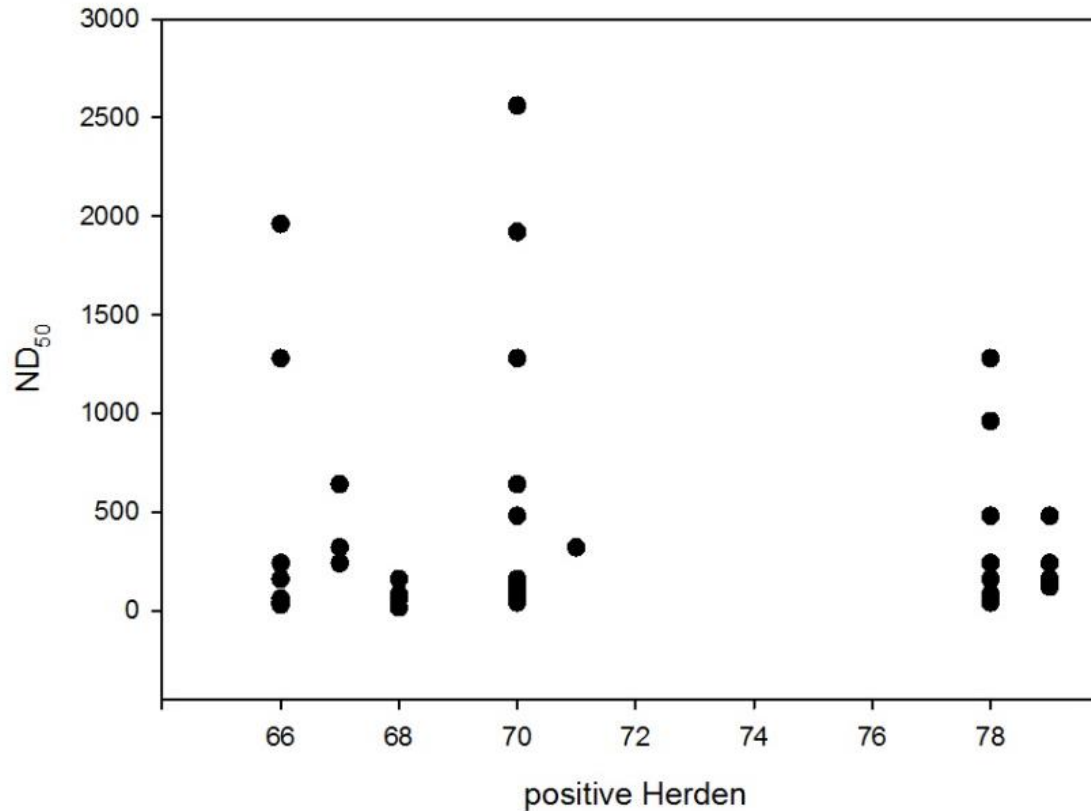
Sachsen-Anhalt



Batai-Virus Ak-Nachweise in Sachsen-Anhalt



neutralisierende Antikörpertiter
Ziegen 2014 ST



ND₅₀ von 1:15 bis 1:2560, meist über 1:80

Batai-Virus Untersuchungen in Brandenburg

Batai-Virus Nachweis in Moskitos/ entomologische AG Dr. Kampen am FLI (Scheuch et al. 2018)



- Peitzer Teichgebiet im Juli 2013
- Frankfurt/Oder im Januar 2012 (Kescherfang)

Jahr	Herden_Nummer	untersuchte Tiere	davon Batai-Virus positiv (qRT-PCR in BC)	davon BATV-Ak positiv (SNT)	davon BATV-Ak negativ (SNT)	
2013	30	8	0	3	5	3/8
	31	25	0	12	13	12/25
	32	2	0	0	2	0/2
	33	15	0	12	3	12/15
	34	15	0	9	6	9/15
	35	15	0	7	8	7/15
	36	13	0	0	13	0/13
	37	4	0	1	3	1/4
	38	21	0	4	17	4/21
	39	14	0	9	5	9/14
	40	3	0	1	2	1/3
	41	3	0	2	1	2/3
	42	20	0	1	19	1/20
Summe aller Tiere in 13 Herden		158				61/158



insg. 158 Tiere

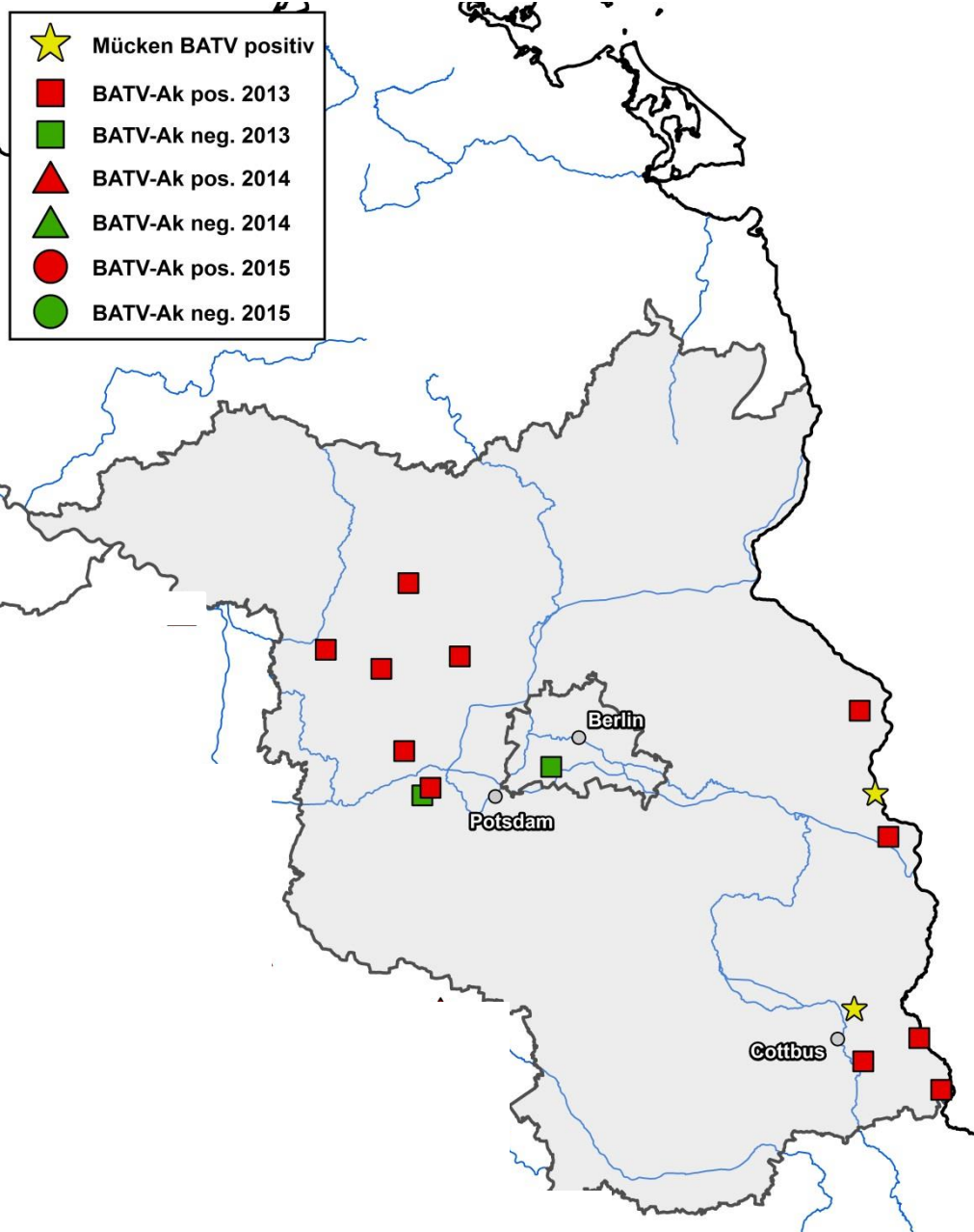
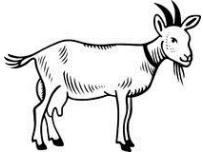
→ BATV-AG alle negativ

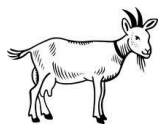
→ BATV-Ak 61 positiv

38,6 %
Seroprävalenz



Brandenburg





Batai-Virus Untersuchungen in Sachsen

Jahr	Herden_Nummer	untersuchte Tiere	davon Batai-Virus positiv (qRT-PCR in BC)	davon BATV-Ak positiv (SNT)	davon BATV-Ak negativ (SNT)	
2013	12	6	0	0	6	0/6
	13	11	0	0	11	0/11
	50	12	0	0	12	0/12
Summe aller Tiere in 3 Herden		29				0/29
2014	94	24	0	4	20	4/24
	95	13	0	0	13	0/13
	100	15	0	1	14	1/15
Summe aller Tiere in 3 Herden		52				5/52
2015	145	9	0	0	9	0/9
	150	20	0	12	8	12/20
	178	40	0	27	13	27/40
	180	19	0	4	15	4/19
Summe aller Tiere in 4 Herden		88				43/169

insg. 169 Tiere → BATV-AG alle negativ
BATV-Ak 48 positive in 2014 + 2015

28,4 %
Seroprävalenz



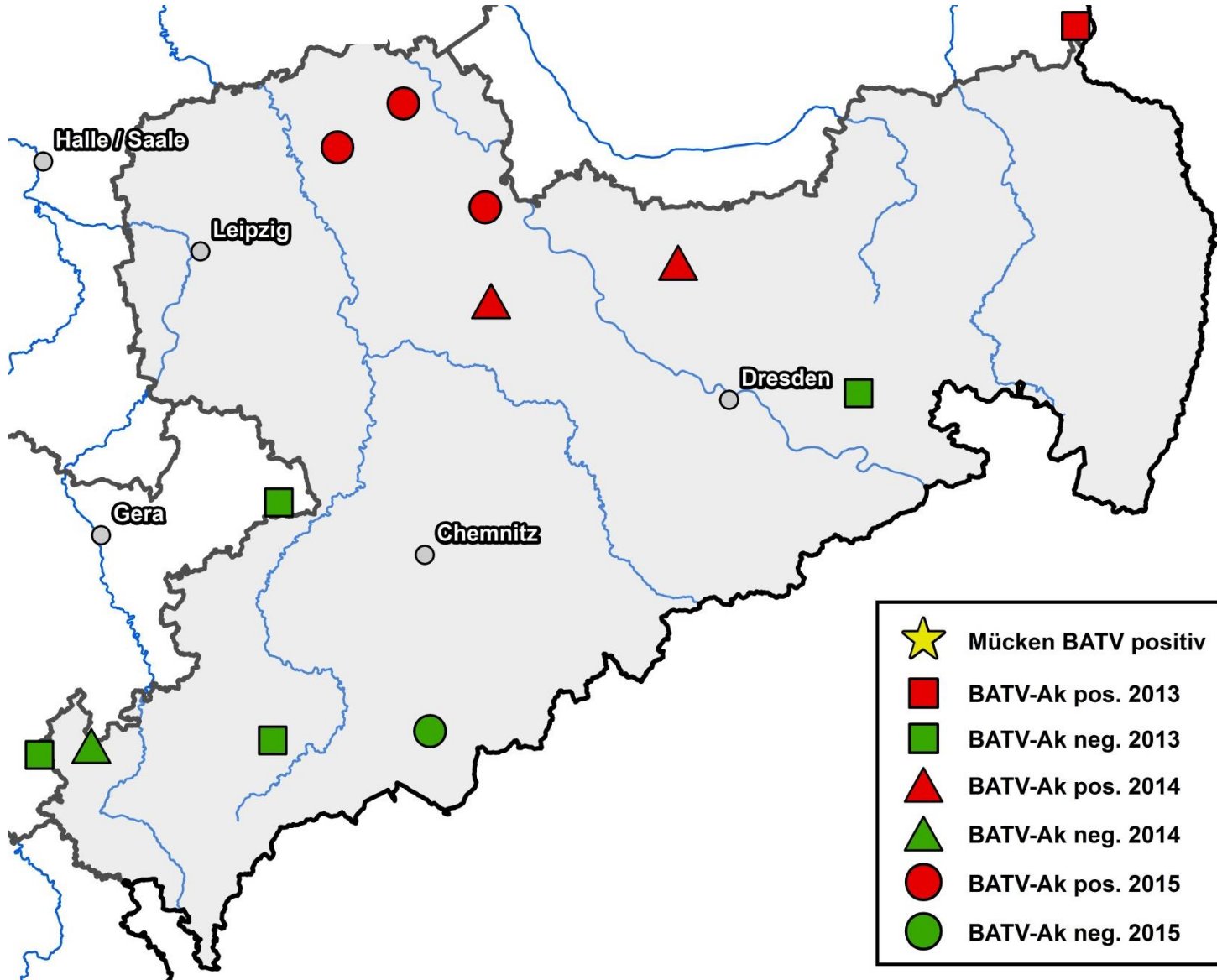
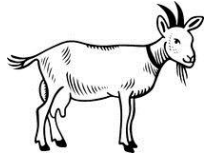
FRIEDRICH-LOEFFLER-INSTITUT

seit 1910

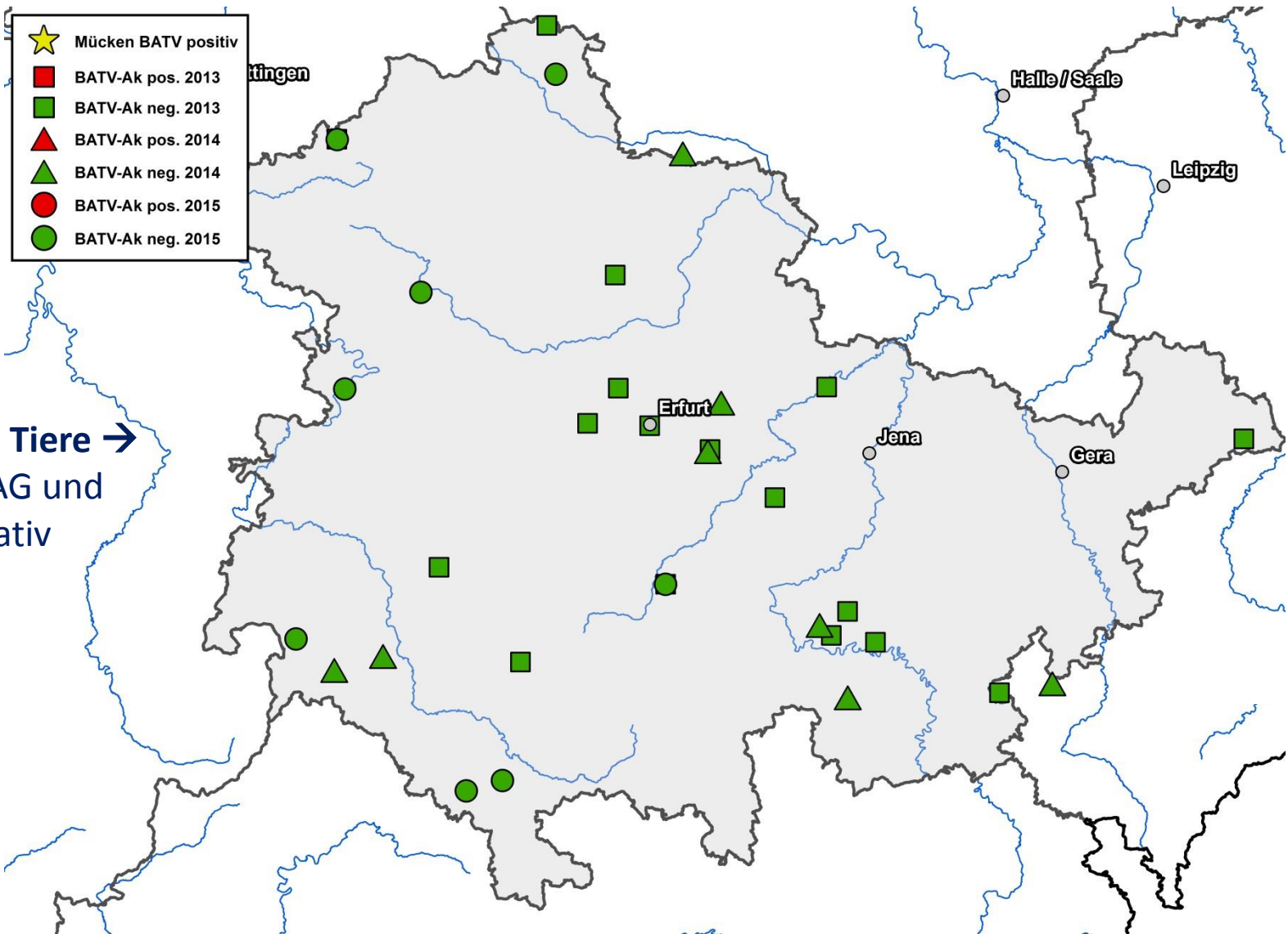
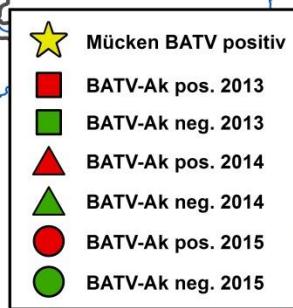
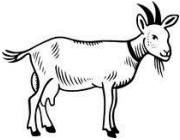
FLI

Bundesforschungsinstitut für Tiergesundheit
Federal Research Institute for Animal Health

Sachsen



Thüringen

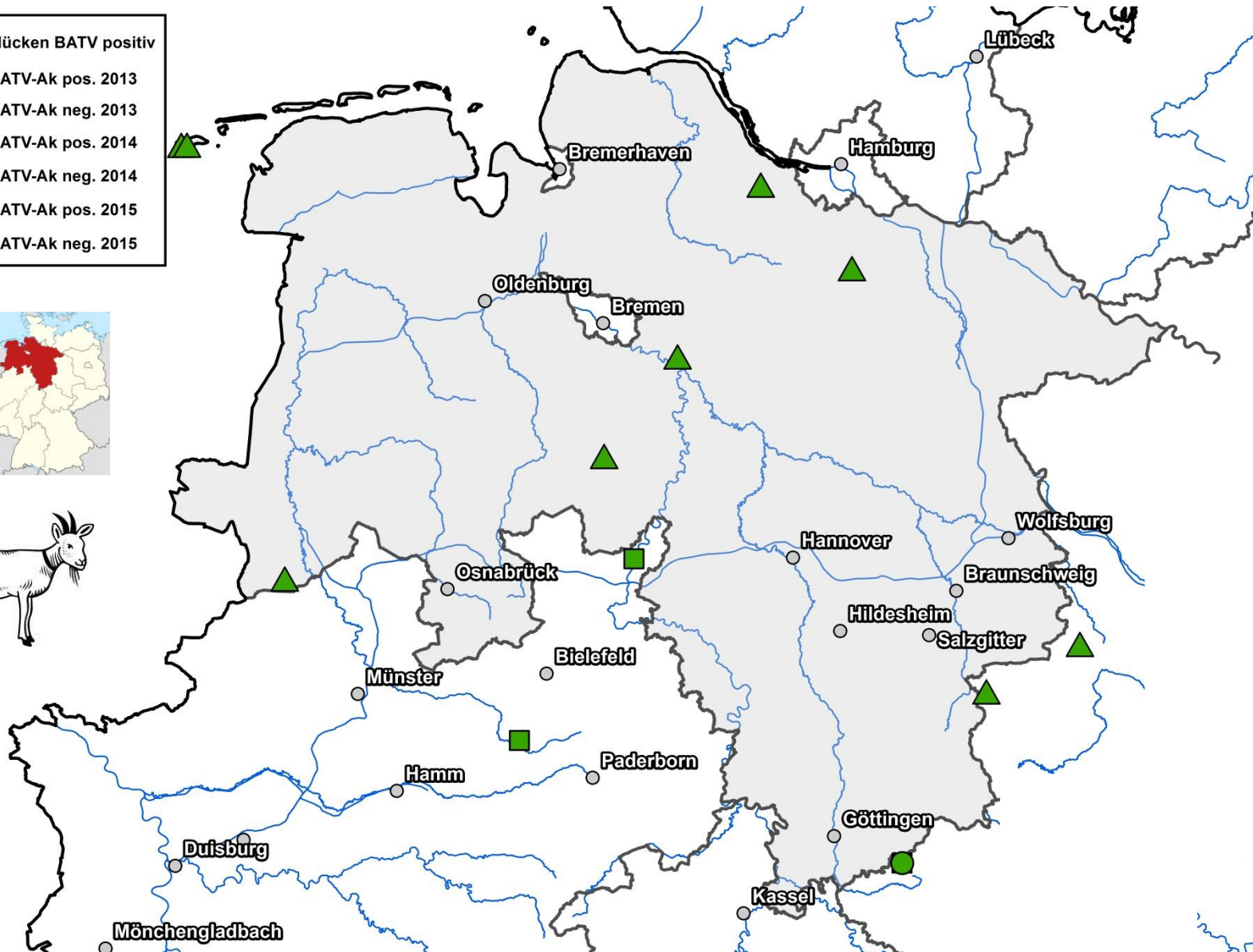
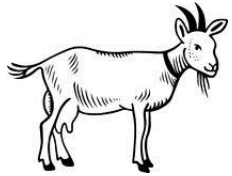
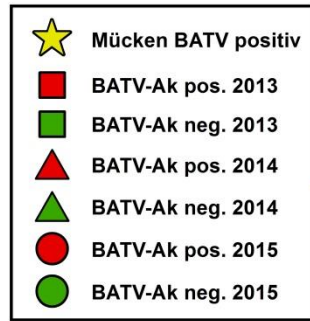


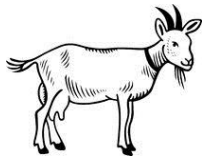
insg. 259 Tiere →
BATV – AG und
Ak – negativ

Niedersachsen

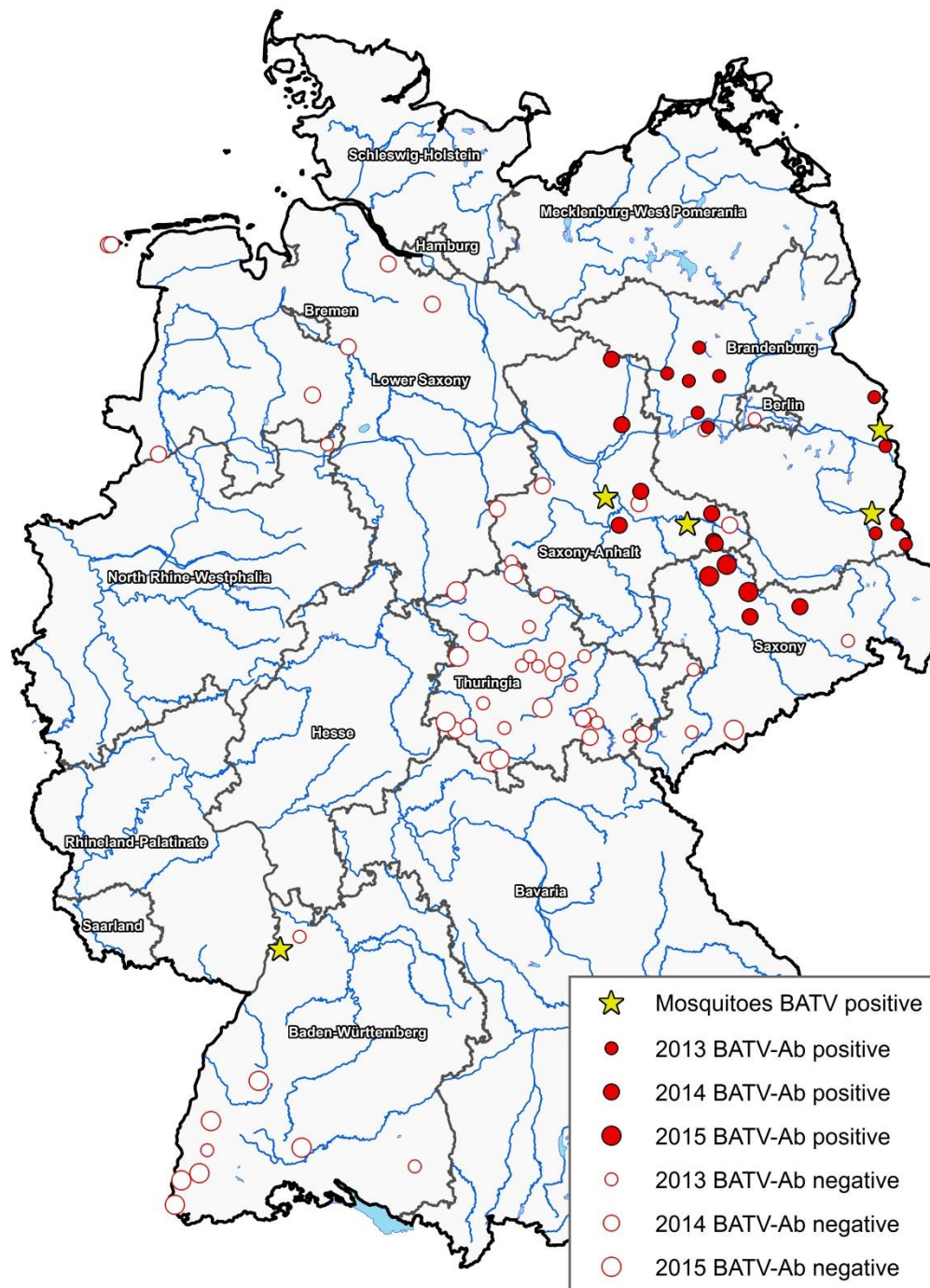
insg. 120 Tiere aus 10 Herden in 2013 und 2015

→ BATV – AG und Ak – negativ

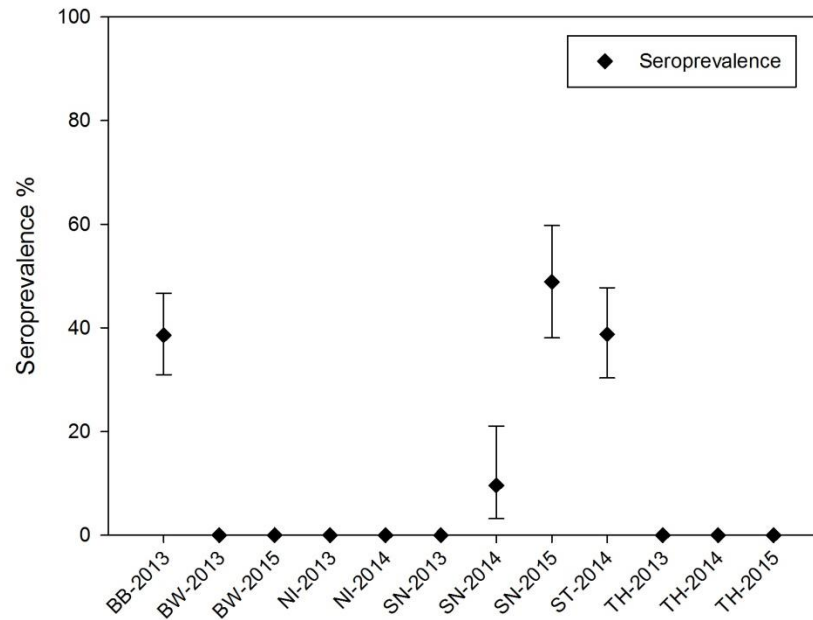
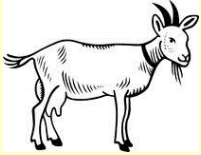




Batai-Virus Untersuchungen in Ziegen in 6 Bundesländern (BW, TH, ST, BB, SN, NI) von 2013 - 2015



Mückennachweise unter:
Jöst et al. 2009,
Scheuch et al. 2018



Untersuchungen an Ziegen von 2013-2015

- kein Batai-Virusnachweis
- aber spezifische BATV-Ak in 3 Bundesländern nachgewiesen:

- Sachsen-Anhalt = 38,8% Seroprävalenz
- Brandenburg = 38,6% Seroprävalenz
- Sachsen = 9,6% Seroprävalenz (2014)
= 48,9% Seroprävalenz (2015)

} 28,4%

**Batai-Virus Untersuchungen
auf das Vorkommen
von spezifischen Antikörpern
im Jahr 2016
in Sachsen-Anhalt
ausgedehnt auf Rinder,
Schafe und Ziegen:**

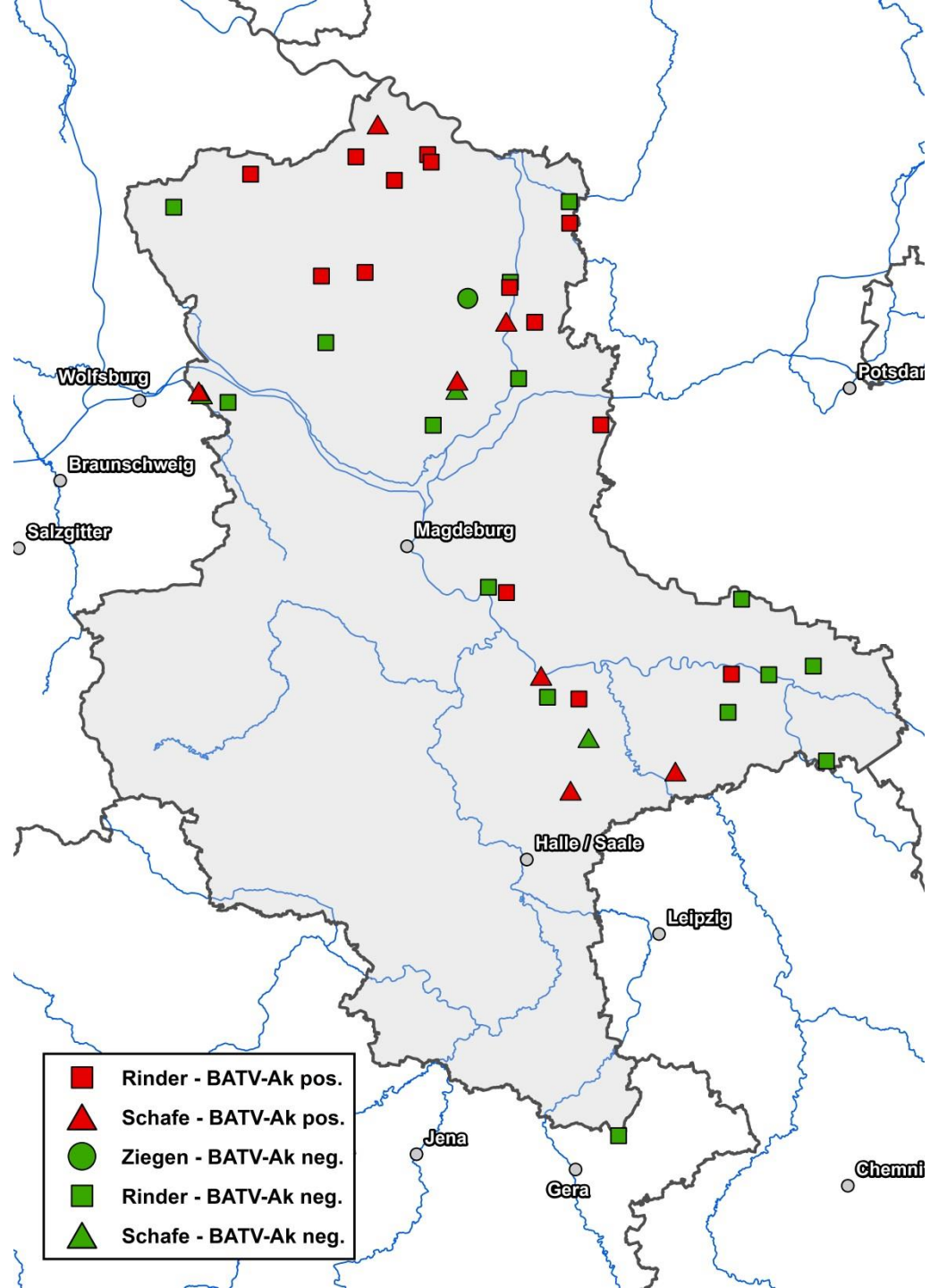


	im Jahr 2016		
	Schafe	Ziegen	Rinder
insgesamt	141	8	258
davon BATV-Ak- positiv	63	0	94

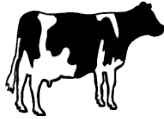
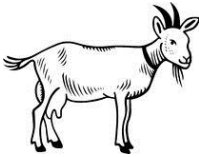
Seroprävalenz:

Schafe: 44,6%

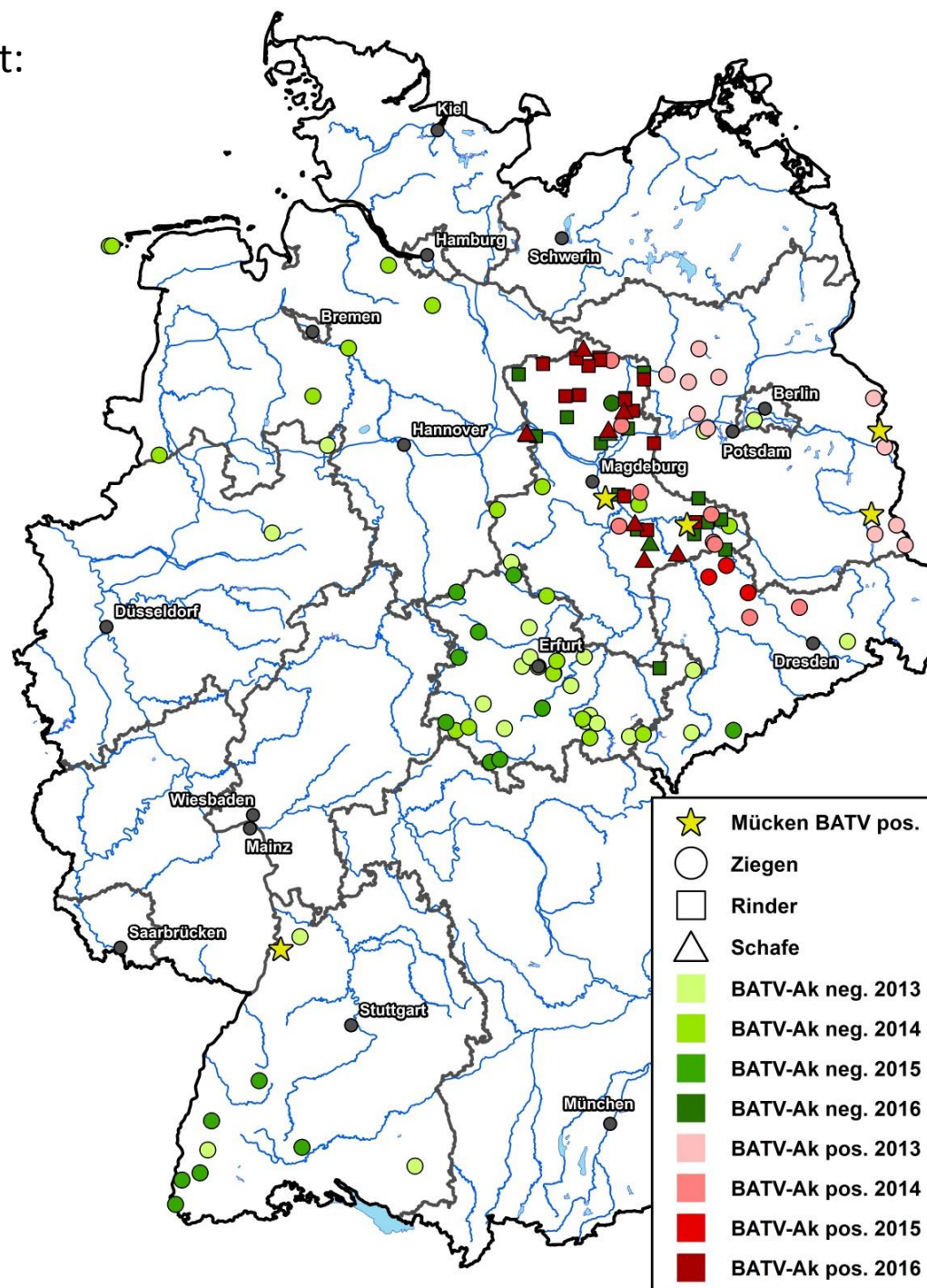
Rinder: 36,4%



Batai-Virus insgesamt:

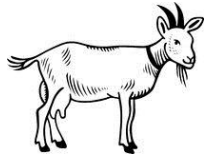


**Untersuchungen
von 2013
bis 2016
an vorrangig Ziegen,
aber auch Schafe
und Rinder
(in 2016 in ST)**

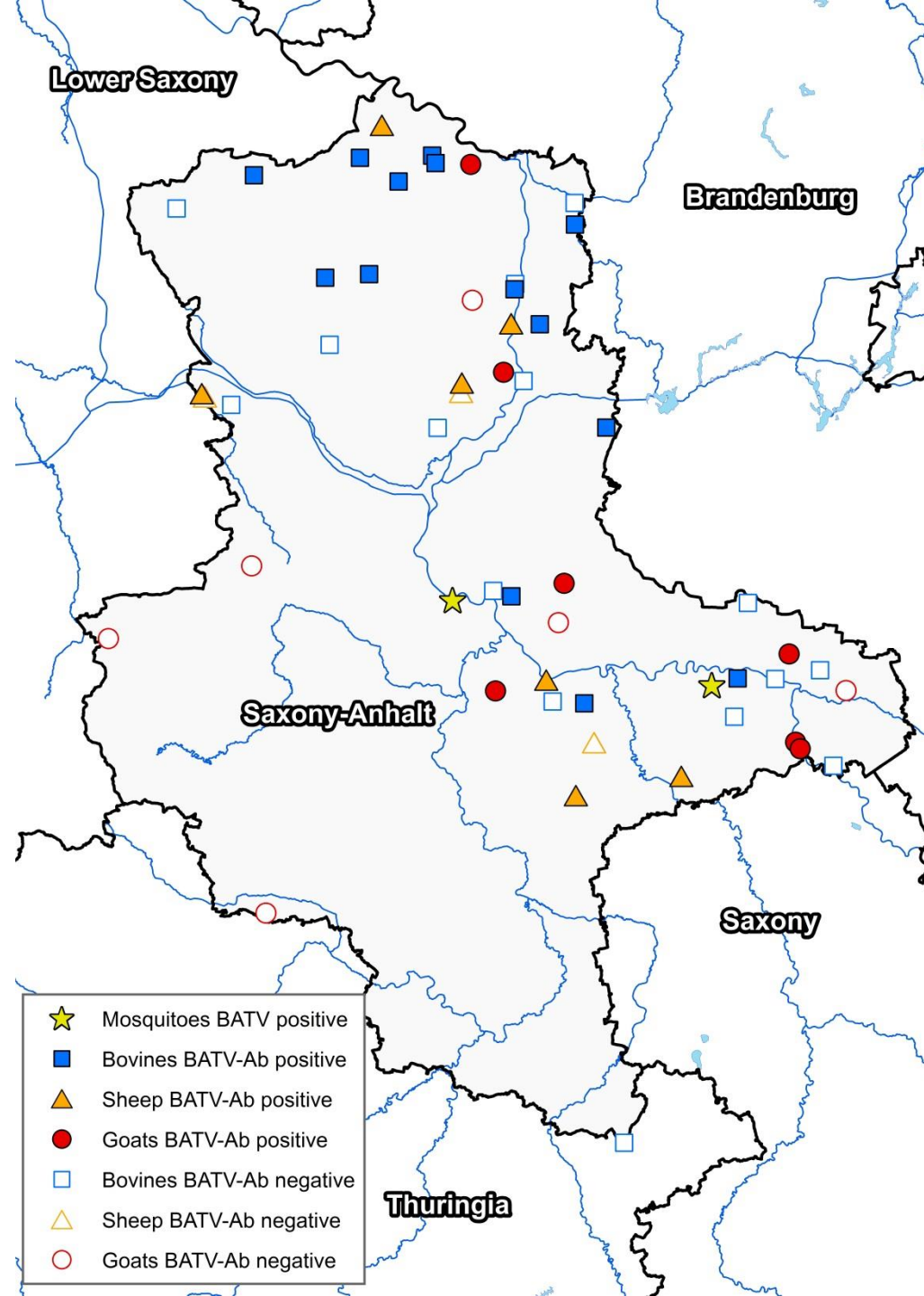


BATV Antikörper-
Nachweis

Batai-Virus insgesamt:



Untersuchungen in ST 2014 und 2016





Contents lists available at ScienceDirect

Veterinary Microbiology

journal homepage: www.elsevier.com/locate/vetmic



Short Communication

Seroprevalance of Batai virus in ruminants from East Germany

Ute Ziegler^{a,*}, Martin H. Groschup^a, Patrick Wysocki^b, Franziska Press^a, Bernd Gehrman^c, Christine Fast^a, Wolfgang Gaede^c, Dorothee E. Scheuch^a, Martin Eiden^a

^a Friedrich-Loeffler-Institut, Federal Research Institute for Animal Health, Institute of Novel and Emerging Infectious Diseases, Südufer 10, D-17493, Greifswald-Insel Riems, Germany

^b Friedrich-Loeffler-Institut, Federal Research Institute for Animal Health, Institute of Epidemiology, Südufer 10, D-17493, Greifswald-Insel Riems, Germany

^c Landesamt für Verbraucherschutz Sachsen-Anhalt, Fachbereich Veterinärmedizin, Hoferbreiter Weg 132-135, D-39576, Stendal, Germany



ARTICLE INFO

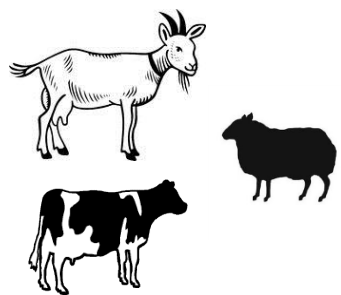
Keywords:

Batai virus
Arbovirus
Emerging virus
Seroprevalence
Ruminants
Germany

ABSTRACT

Batai virus (BATV), a mosquito-transmitted *Orthobunyavirus*, was first detected in Southwest Germany in anopheline and culicine mosquitoes in 2009. However, little is known about the exposure to BATV infections for farm animals and humans in Germany as almost no systematic surveillance or infection studies have been carried out to date. This may explain why clinical symptoms in animals or humans have not been reported so far. Therefore and since BATV has meanwhile been detected repeatedly in different mosquito species in several regions of Germany, we performed a surveillance study by assaying more than 1300 blood samples from ruminants (goats, bovines, sheep) from six different federal states covering the years 2013 to 2016. Samples were investigated by BATV-specific real-time polymerase chain reaction as well as by virus neutralisation test. BATV-specific RNA was not detected, whereas BATV-specific antibodies were found in livestock from various geographic regions. We have determined the seroprevalence of 38.8% for goats, 44.7% for sheep and 36.4% for bovines in Saxony-Anhalt. The seroprevalence of goats from Brandenburg was 38.6% and of goats from Saxony 28.4%.

These results confirm the levels of seroprevalence to BATV, suggesting endemic circulation, in different regions and indicate that ruminants are potential hosts of BATV in East Germany. Furthermore, the role of BATV as segment donor in disease emergence events should not be overlooked.

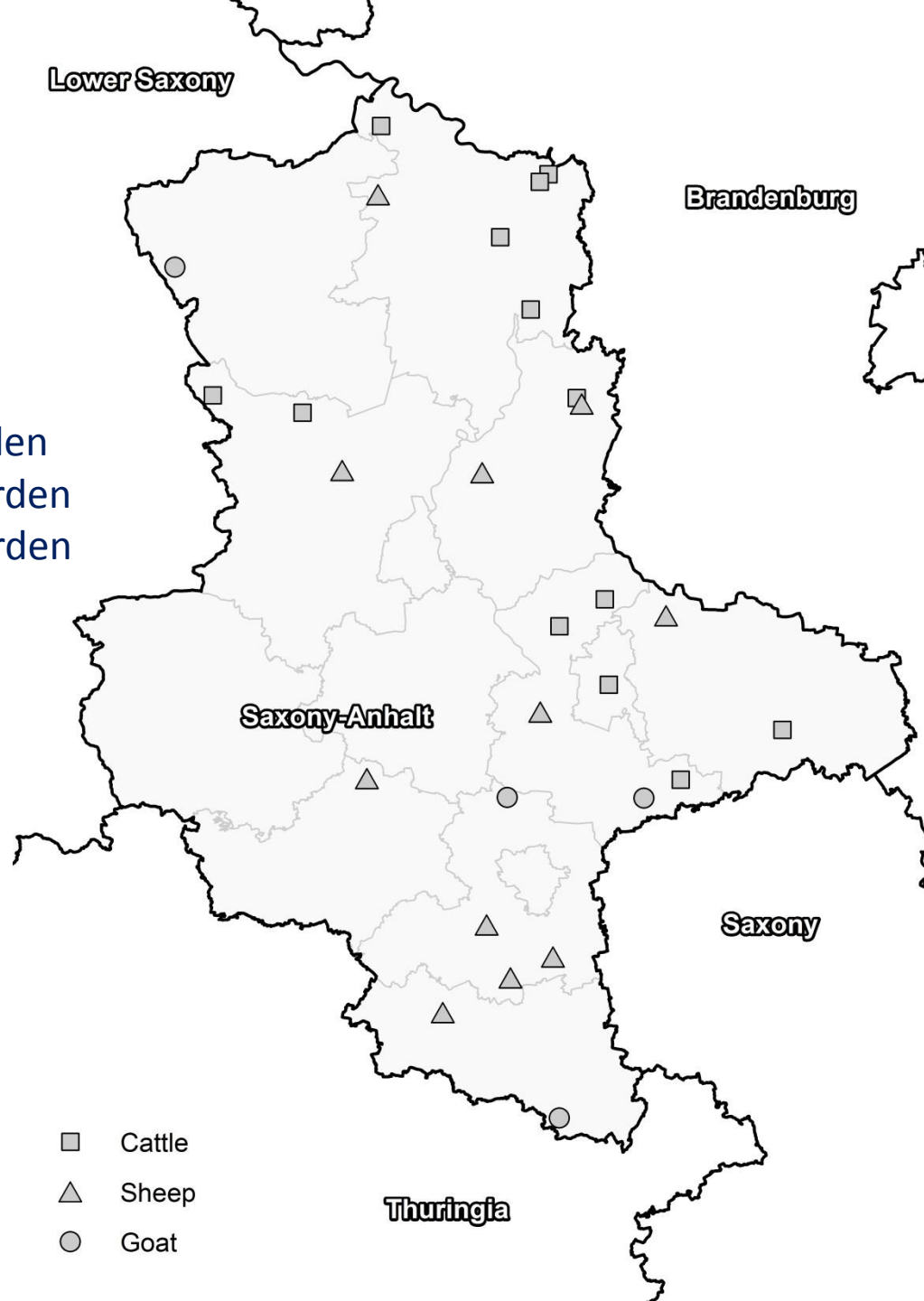


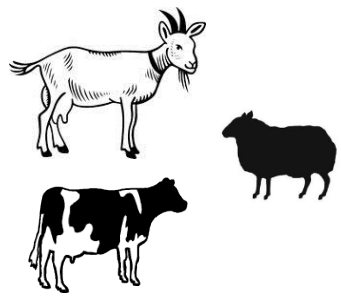
Proben aus **ST 2018**:

Ziegen: 60 aus 4 Herden

Schafe: 121 aus 11 Herden

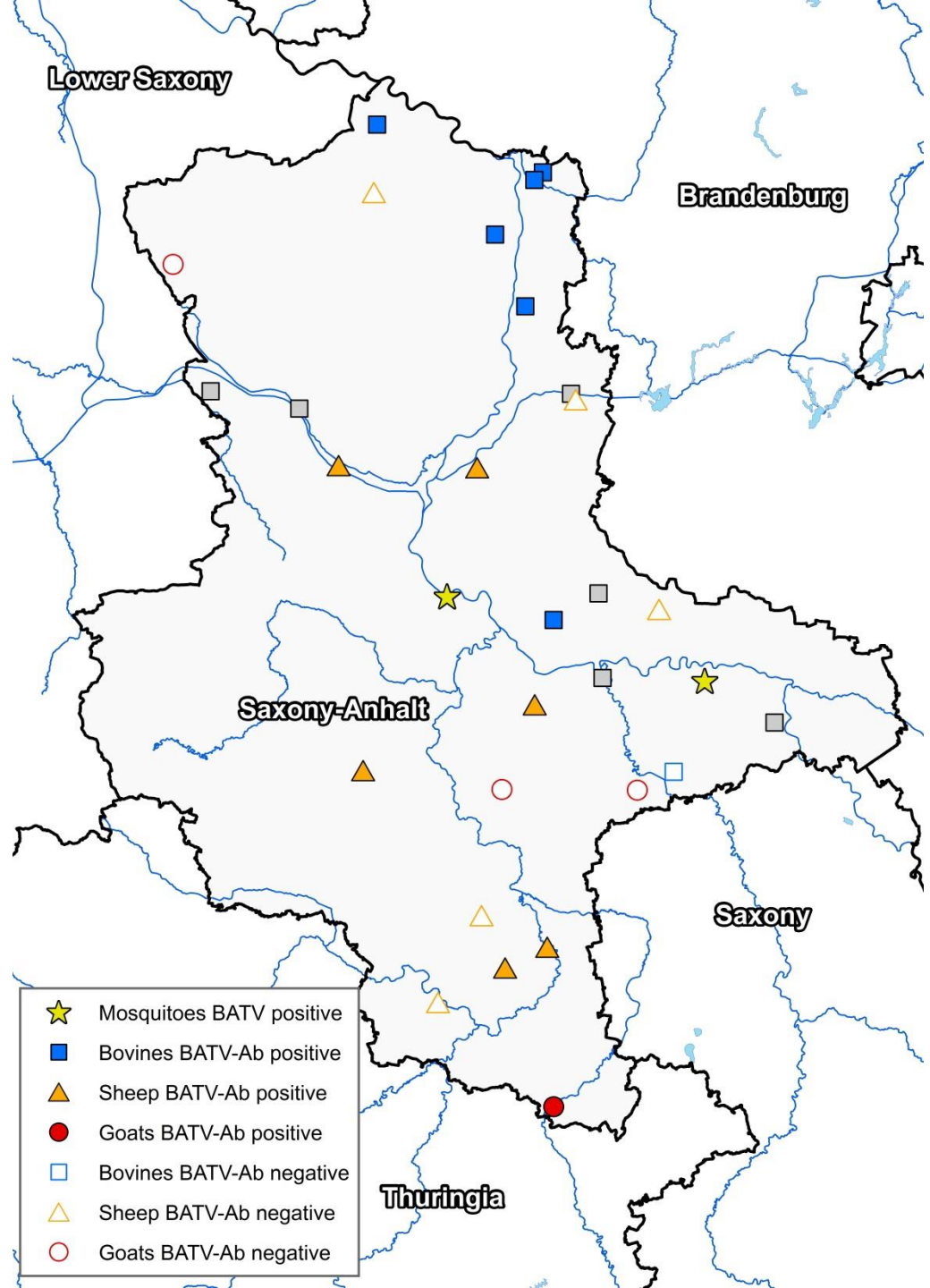
Rinder: 144 aus 13 Herden





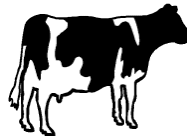
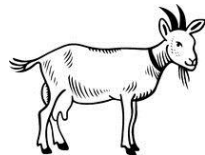
Proben aus ST 2018:

	im Jahr 2018		
	Ziegen	Schafe	Rinder
insgesamt	60	121	144
davon BATV-Ak- positiv	11	20	bisher 37

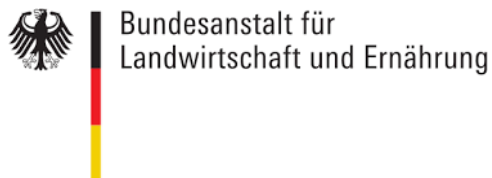


Batai-Virus (BATV) Zusammenfassung:

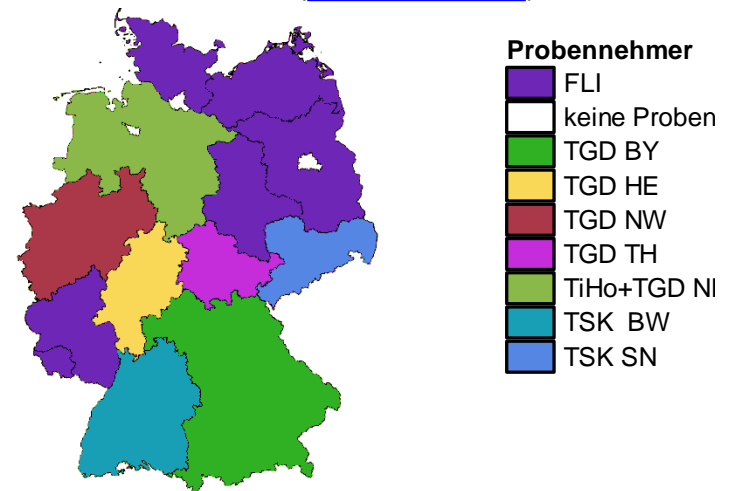
- **kein Batai-Virusnachweis in Ziegen in 6 Bundesländern von 2013 - 2015**
- **aber spezifische BATV-Ak in Ziegen in 3 Bundesländern nachgewiesen:**
(ST = 38,8%, BB = 38,6%, SN = 28,4% Seroprävalenz)
- **zusätzliche Untersuchungen in 2016 in ST**
(hier deutliche Seroprävalenzen für Schafe 44,6% und Rinder 36,4% ermittelt)
- **auch positive BATV-Ak-Nachweise für 2018 in ST** (Rind, Schaf, Ziege)
- **weite Verbreitung von BATV-Infektionen in Wiederkäuern in Ost-Deutschland**
- **regionale Korrelation mit den Nachweisen von BATV in Stechmücken**
- **bisher keine Klinik bei den Wiederkäuern durch BATV-Infektion festgestellt**
- **bei der Diagnostik an mögliche weitere Arbovirusinfektion denken**
- **in-house ELISA wird angepasst**



CuliMo / CuliFo



EU (EMIDA-ERA-NET) gefördertes Projekt
„Goat-TSE-Free“ (www.goatbse.eu)



Einzugsgebiete der jeweiligen Probennehmer bei Blutprobenentnahme der Ziegen:

FLI: Friedrich-Loeffler-Institut (Franziska Press); TSK: Tierseuchenkasse;
TGD: Tiergesundheitsdienst; TiHo: Tierärztliche Hochschule,



SACHSEN-ANHALT

Landesamt für Verbraucherschutz Stendal

Vielen Dank für Ihre Aufmerksamkeit !



FRIEDRICH-LOEFFLER-INSTITUT

seit 1910

FLI

Bundesforschungsinstitut für Tiergesundheit
Federal Research Institute for Animal Health