Automated magnetic bead-based extraction of 1 to 48 Samples using the IndiMag 48s

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Introduction

Plastic waste is an issue in automated molecular biology protocols with high minimum sample numbers. The most common choice for the automation of magnetic bead-based nucleic acid extraction from veterinary samples are 96-well platforms, which require plastic ware for 96 samples for the protocol, regardless of the actual sample number.

The IndiMag 48s is a new platform from INDICAL BIOSCIENCE intended for magnetic bead-based extraction of nucleic acids from veterinary samples. Designed to be as fast and reliable as current available solutions, but with greater flexibility and user friendliness, the IndiMag 48s accepts 1 to 48 samples and only requires plastics for the desired number of samples.

In this study, we evaluated the reliability of IndiMag 48s extraction protocols for RNA and DNA from veterinary samples to show that there is a viable option for maintaining or improving result quality while reducing plastic waste.

Material and methods

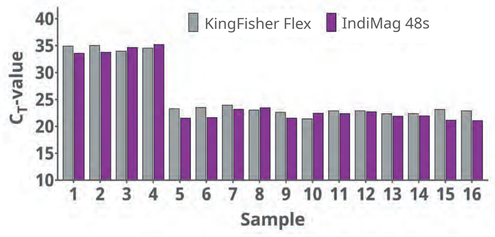
Nucleic acids were extracted from serum, blood, tissue and fecal samples using the IndiMag Pathogen Kit (INDICAL) and from milk samples using the IndiMag Mastitis Kit (INDICAL). We compared two automated extraction methods: the 5-step protocol for the KingFisher Flex System (ThermoFisher) and the 4-step protocol for the IndiMag 48s (INDICAL).

The isolates were tested using INDICAL's virotype RT-qPCR Kits for the identification of RNA from Bovine Viral Diarrhea Virus (BVDV), RNA from Schmallenberg Virus (SBV), RNA from Bluetongue Virus (BTV), and bactotype qPCR Kits for detection of DNA from *Mycobacterium avium* subsp. *paratuberculosis* (MAP) and DNA from Gram-positive and Gram-negative bacteria in milk. External validation data showing the comparison to the spin-column-based QIAamp Viral RNA Mini Kit (QIAGEN) are also presented.

Validation results of the IndiMag Pathogen Kit on IndiMag 48s vs. KingFisher Flex

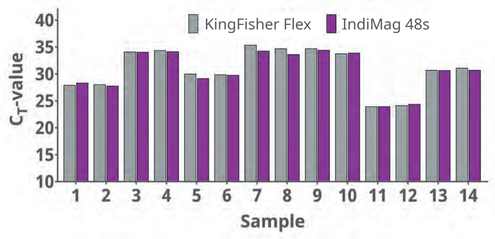
Comparable identification of BVDV-RNA

Sample material	Blood, Serum
RT-qPCR	virotype BVDV RT-PCR Kit



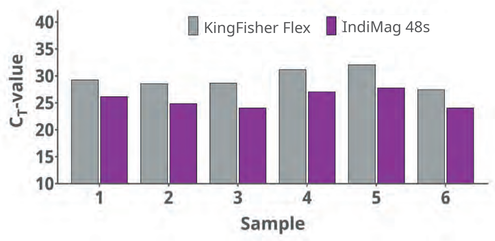
Comparable identification of SBV-RNA

Sample material	Tissue (brain, lung, liver, spleen)
Pretreatment	Protocol T1
RT-qPCR	virotype SBV RT-PCR Kit



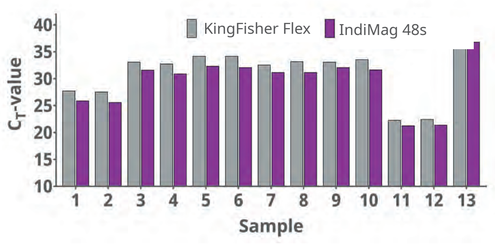
Improved detection of BTV-RNA

Sample material	Blood
RT-qPCR	virotype BTVpan/8 RT-PCR Kit and virotype BTVpan/4 RT-PCR Kit



Improved detection of MAP-DNA

Sample material	Feces
Pretreatment	Supplementary Protocol F-MAP
qPCR	bactotype MAP PCR Kit

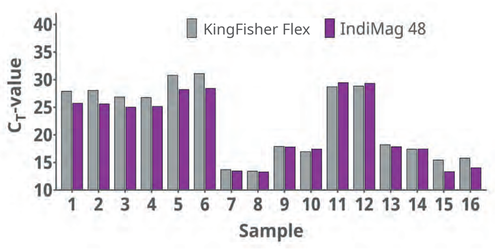


Validation results of the MagAttract Mastitis Kit on IndiMag 48 vs. KingFisher Flex

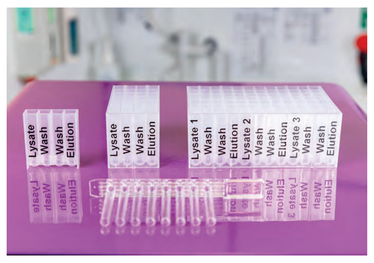
Comparable identification of Mastitis causing pathogens*

Sample material	Milk
Pretreatment	IndiMag Mastitis Kit
qPCR	bactotype Mastitis Screening PCR-Kit

**S. aureus, S. dysgalactiae, S. uberis, S. agalactiae and Mycoplasma bovis*



IndiMag 48s – features and benefits



Fast, flexible and compact

- Throughput: 1 to 48 extractions per run in just 30 minutes
- Small footprint: 36.4 (W) x 42.0 (D) x 38.6 (H) cm – fits in any lab
- Low amounts of plastics needed – low operating costs

Plug & Play

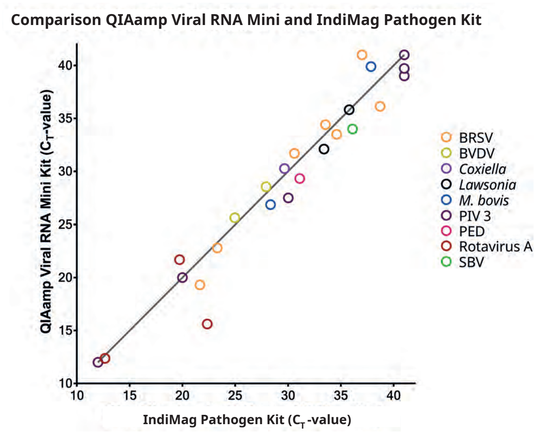
- No installation required – up and running in next to no time
- Simple, easy-to-use touchscreen/graphical interface
- Pre-loaded protocols for the IndiMag sample extraction kits
- Plate loader with integrated heating units

Safe

- UV light decontamination

Comparable results for the QIAamp Viral RNA Mini Kit vs. the IndiMag Pathogen Kit on IndiMag 48s

Sample material	Nasal swabs (BRSV, PI3, *Mycoplasma bovis*), Serum (SBV, BVDV), Feces (*Lawsonia*, BVDV, Rotavirus A, PEDV), Placenta (*Coxiella*)



Conclusion

- IndiMag 48s supports cost-efficient nucleic acid extraction with reduced plastic waste thanks to its flexible sample size acceptance.
- It is highly user friendly: it comes with pre-loaded protocols for automation of the IndiMag Pathogen Kit and the IndiMag Mastitis Kit and it offers the possibility to add up to 48 additional customer protocols
- It is self-contained, requiring no additional software or hardware for creating or editing individual protocols, and it has a small footprint suitable for small labs.
- The run time and result reliability are comparable to or better than those obtained with the 96-well platform assessed here.
- Overall, the IndiMag 48s offers veterinary testing facilities a high-quality, reliable option for nucleic acid extraction with high potential for cost savings and plastic waste reduction.

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