

Merckodia

Bovine Insulin

ELISA

Directions for Use

10-1201-01

REAGENTS FOR 96 DETERMINATIONS





Manufactured by

Merckodia AB

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Merckodia 

EXPLANATION OF SYMBOLS USED ON LABELS

 $\Sigma = 96$	Reagents for 96 determinations
	Expiry date
	Store between 2-8°C
	Lot No.

INTENDED USE

Mercodia Bovine Insulin ELISA provides a method for the quantitative determination of insulin in bovine serum and plasma.

SUMMARY AND EXPLANATION OF THE TEST

Insulin is the principal hormone responsible for the control of glucose metabolism. It is synthesised in the β -cells of the islets of Langerhans as the precursor, proinsulin, which is processed to form C-peptide and insulin. Both are secreted in equimolar amounts into the portal circulation. The mature insulin molecule comprises two polypeptide chains, the A chain and the B chain. The two chains are linked together by two inter-chain disulphide bridges. There is also an intra-chain disulphide bridge in the A chain.

Secretion of insulin is mainly controlled by plasma glucose concentration, and the hormone has a number of important metabolic actions. Its principal function is to control the uptake and utilisation of glucose in peripheral tissues via the glucose transporter. This and other hypoglycaemic activities, such as the inhibition of hepatic gluconeogenesis and glycogenolysis are counteracted by the hyperglycaemic hormones including glucagon, epinephrine (adrenaline), growth hormone and cortisol.

It is well known that ruminants show typical insulin resistance compared to mono-gastric animals. During lactation, glucose is effectively re-directed to the mammary gland as a result of an increase in insulin resistance in the peripheral tissue. Furthermore, the level of insulin secretion also differs depending on the physiological states of dairy cattle (1-3).

PRINCIPLE OF THE PROCEDURE

Mercodia Bovine Insulin ELISA is a solid phase two-site enzyme immunoassay. It is based on the direct sandwich technique in which two monoclonal antibodies are directed against separate antigenic determinants on the insulin molecule. During incubation, insulin in the sample reacts with peroxidase-conjugated anti-insulin antibodies and anti-insulin antibodies bound to the microtitration well. After a simple washing step that removes unbound enzyme labelled antibody, the bound conjugate is detected by reaction with 3,3'-5,5'-tetramethylbenzidine (TMB). The reaction is stopped by the addition of acid, giving a colorimetric endpoint that can be read spectrophotometrically.

WARNINGS AND PRECAUTIONS

- The content of this kit and their residues must not be allowed to come into contact with ruminating animal or swine.
- The Stop Solution in this kit contains 0.5 M H_2SO_4 . Follow routine precautions for handling hazardous chemicals.
- All patient samples should be handled as capable of transmitting infections.

MATERIAL REQUIRED BUT NOT PROVIDED

- Pipettes for 25, 50, 100, 200 and 1000 μ l (repeat pipettes preferred for addition of enzyme conjugate solution, Substrate TMB and Stop Solution)
- Beakers and cylinders for reagent preparation
- Redistilled water
- Microplate reader (450 nm filter)
- Plate shaker (The recommended velocity is 700-900 cycles per minute, orbital movement)
- Microplate washing device

REAGENTS

Each Mercodia Bovine Insulin ELISA kit contains reagents for 96 wells, sufficient for 42 samples and one calibrator curve in duplicate. For larger series of assays, use pooled reagents from packages bearing identical lot numbers. The expiry date for the complete kit is stated on the outer label. The recommended storage temperature is 2-8°C.

Coated Plate (Mouse monoclonal anti-insulin)	1 plate 8-well strips	96 wells	Ready for use
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For unused microtitration strips, reseal the bag using adhesive tape and store at 2-8°C for 2 months.

Calibrators 1, 2, 3, 4, 5 (Bovine insulin) Concentration stated on vial label.	5 vials	1000 µl	Ready for Use
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Calibrator 0 Color coded yellow	1 vial	5 ml	Ready for use
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Enzyme Conjugate 11X (Peroxidase conjugated mouse monoclonal anti-insulin)	1 vial	1.3 ml	Preparation, see below
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Enzyme Conjugate Buffer Color coded blue	1 vial	13 ml	Ready for use
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Wash Buffer 21X Storage after dilution: 2-8°C for 2 months	1 bottle	40 ml	Dilute with 800 ml redistilled water to make wash buffer.
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Substrate TMB (TMB) Colorless solution <i>Note! Light sensitive!</i>	1 bottle	22 ml	Ready for use
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Stop Solution 0.5 M H ₂ SO ₄	1 vial	7 ml	Ready for use
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Preparation of enzyme conjugate solution

Prepare the needed volume of enzyme conjugate solution by dilution of Enzyme Conjugate 11X, (1+10) in Enzyme Conjugate Buffer according to the table below. Mix gently.

When preparing enzyme conjugate solution for the whole plate or if the reagents are to be used within 2 weeks, pour all of the Enzyme Conjugate Buffer into the Enzyme Conjugate 11X vial.

Number of strips	Enzyme Conjugate 11X	Enzyme Conjugate Buffer
12 strips	1 vial	1 vial
8 strips	700 µl	7 ml
6 strips	500 µl	5 ml
4 strips	400 µl	4 ml

Storage after dilution: 2-8°C for 2 weeks.

SPECIMEN COLLECTION AND HANDLING

Serum

Collect blood by venipuncture, allow to clot and separate the serum by centrifugation. Samples can be stored at 2-8°C up to 24 hours. For longer periods, store samples at -20°C. Avoid repeated freezing and thawing.

Plasma

Collect blood by venipuncture into tubes containing heparin, citrate or EDTA as anticoagulant, and separate the plasma fraction. Samples can be stored at 2-8°C up to 24 hours. For longer periods store samples at -20°C. Avoid repeated freezing and thawing.

PREPARATION OF SAMPLES

No dilution is normally required for serum or plasma. All samples containing bovine insulin above the highest calibrator should be diluted with Calibrator 0 or with Mercodia Diabetes Sample Buffer 10-1195-01.

TEST PROCEDURE

All reagents and samples must be brought to room temperature before use. Perform each determination in duplicate for calibrators and unknowns. Prepare a calibrator curve for each assay run.

1. Prepare enzyme conjugate solution (according to the table on previous page) and wash buffer.
2. Prepare sufficient microplate wells to accommodate Calibrators and samples in duplicate.
3. Pipette 25 μ l each of Calibrators and samples into appropriate wells.
4. Add 100 μ l of enzyme conjugate solution into each well.
5. Incubate on a plate shaker (700-900 rpm) for 2 hours at room temperature (18-25°C).
6. Wash plate 6 times with 700 μ l wash buffer per well with an automatic washer. *
After final wash, invert and tap the plate against absorbent paper.
7. Add 200 μ l Substrate TMB into each well.
8. Incubate for 15 minutes at room temperature (18-25°C).
9. Add 50 μ l Stop Solution to each well.
Place the plate on the shaker for approximately 5 seconds to ensure mixing.
10. Read optical density at 450 nm and calculate results.
Read within 30 minutes.

* The plate can be washed with an automatic washer or manually. When washing with an automatic washer please use the overflow function. If there is no overflow function available on the automatic washer please wash manually.

Manual wash can be done either with a pipette or a squirt bottle:

Aspirate the reaction volume and add 400 μ l wash buffer to each well with a pipette or fill the wells completely by spraying wash buffer into the wells with a squirt bottle. Aspirate completely and repeat 5 times. The overflow is not a problem rather an advantage.

Note! To prevent contamination between the conjugate and substrate, separate pipettes are recommended.

INTERNAL QUALITY CONTROL

Commercial control and/or internal serum pools with low, intermediate and high bovine insulin concentrations should routinely be assayed as unknowns, and results charted from day to day. It is good laboratory practice to record the following data for each assay: kit lot number; reconstitution dates of kit components; OD values for the blank, Calibrators and controls.

CALCULATION OF RESULTS

Computerized calculation

The concentration of bovine insulin is obtained by computerized data reduction of the absorbance for the Calibrators, except Calibrator 0, versus the concentration using cubic spline regression.

Manual calculation

1. Plot the absorbance values obtained for the Calibrators, except Calibrator 0, against the bovine insulin concentration on a lin-lin paper and construct a calibrator curve.
2. Read the concentration of the unknown samples from the calibrator curve.

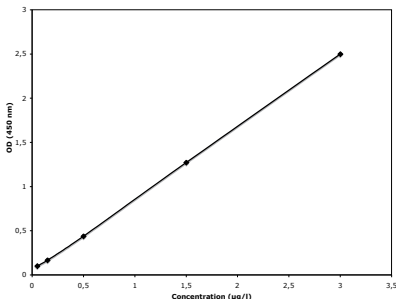
Example of results

Wells	Identity	A ₄₅₀	Mean conc. µg/l
1A-B	Calibrator 0	0.069/0.071	
1C-D	Calibrator 1 (0.05)*	0.100/0.100	
1E-F	Calibrator 2 (0.15)*	0.169/0.160	
1G-H	Calibrator 3 (0.5)*	0.445/0.449	
2A-B	Calibrator 4 (1.5)*	1.319/1.267	
2C-D	Calibrator 5 (3.0)*	2.525/2.523	
2E-F	Unknown 1	0.138/0.140	0.109
2G-H	Unknown 2	0.460/0.485	0.541
3A-B	Unknown 3	1.170/1.155	1.368

*Exact concentration indicated on vial label.

Example of calibrator curve

A typical calibrator curve is shown here. Do not use this curve to determine actual assay results.



LIMITATIONS OF THE PROCEDURE

Grossly lipemic, icteric or haemolyzed samples do not interfere in the assay.

EXPECTED VALUES

Good practice dictates that each laboratory establishes its own expected range of values.

PERFORMANCE CHARACTERISTICS

Detection limit

Detection limit is defined as the Capability of Detection according to ISO11843-Part 1. Capability of Detection should be seen as part of a method validation, rather than the lowest concentration that can be measured.

The detection limit is 0.025 ($\mu\text{g/l}$) determined with the methodology described in ISO11843-Part 4.

Concentration of samples with absorbance below Calibrator 1 should not be calculated, instead expressed as less or equal to \leq the concentration indicated on the vial for Calibrator 1.

Recovery

Recovery upon addition is 86-107 % (mean 96 %).

Recovery upon dilution is 91-131 % (mean 107 %).

Hook effect

Samples with a concentration of up to 1 000 $\mu\text{g/l}$ can be measured without giving falsely low results.

Precision

Each sample was analyzed in 4-replicates on 20 different occasions.

Sample	Mean value ($\mu\text{g/l}$)	Coefficient of variation		
		within assay %	between assay %	total assay %
1	0.224	5.3	6.7	7.2
2	0.497	3.9	7.0	7.3
3	1.401	2.3	6.7	6.8

Specificity

The following cross reaction have been found:

NovoRapid 3.8 %

Levemir < 0.0000004 %

Lantus 28 %

Humalog < 0.000001 %

CALIBRATION

Mercodia Bovine Insulin ELISA is calibrated against an inhouse reference preparation of bovine insulin.

WARRANTY

The performance data presented here was obtained using the procedure indicated. Any change or modification in the procedure not recommended by Mercodia AB may affect the results, in which event Mercodia AB disclaims all warranties expressed, implied or statutory, including the implied warranty of merchantability and fitness for use. Mercodia AB and its authorized distributors, in such event, shall not be liable for damages indirect of consequential.

REFERENCES

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2. Itoh F, Komatsu T, Kushibiki S, Hodate K (2006) Effects of ghrelin injection on plasma concentrations of glucose, pancreatic hormones and cortisol in Holstein dairy cattle. *Comp Biochem Physiol* 143:97-102
3. Odensten MO, Berglund B, Waller KP, Holtenius K (2007) Metabolism and udder health at dry-off in cows of different breeds and production levels. *J Dairy Sci* 90:1417-1428

SUMMARY OF PROTOCOL SHEET

Add Calibrators and samples	25 μ l
Add enzyme conjugate solution	100 μ l
Incubate	2 hours at 18-25°C on a plate shaker
Wash plate with wash buffer	6 times
Add Substrate TMB	200 μ l
Incubate	15 minutes at 18-25°C
Add Stop Solution	50 μ l Shake for 5 seconds to ensure mixing
Measure A450	Evaluate results