Small Animals
Automatic Respiration Calorimetry System

Institute of Animal Sciences, Chinese Academy of Agricultural Sciences
中国农业科学院北京畜牧兽医研究所
Address: No. 2 Yuanmingyuan West Rd, Beijing, 100193, P. R. China
地址：中国.北京市海淀区圆明园西路2号

Hunan Zhongben Intelligent Technology Development Co., LTD.
湖南中本智能科技发展有限公司
Address: Building A1, No.27 Wenxuan Rd, Changsha, Hunan Province, P. R. China
地址：中国.湖南省长沙市文轩路27号麓谷企业广场A1栋

Global Marketing Partner (Overseas)

UniVOOK Chemical (Shanghai)

26B, No.333 Wensong Rd
Shanghai, P.R. China
www.univook.com

Tel: +86 021 6536 5235
Email: info@univook.com
EHS: ehs@univook.com

Automatic Respiration Calorimetry System

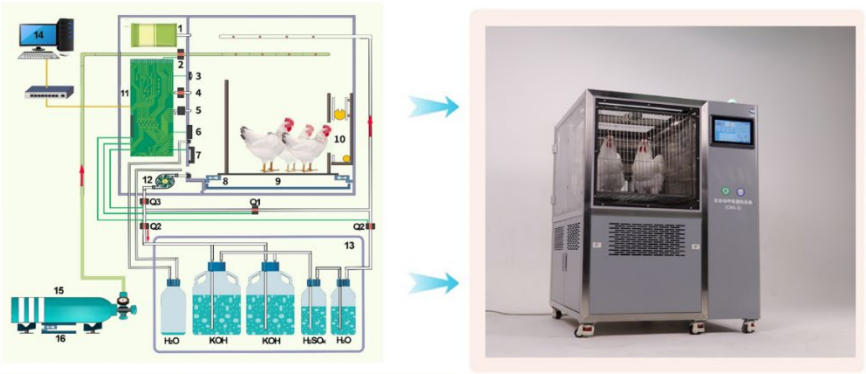
Applications

- Net Energy of Feed;
- Qualitative Regulation of Meat Quality;
- Carbon Emissions,;
- Biological Breeding;

Basic Principles

Calculate by measuring the volume of carbon dioxide exhaled and oxygen consumed by animals over a period:

- Total heat production and fasting metabolic heat production;
- Net energy retained as protein or fat;
- The oxidation quantity of three major substances (fat, protein, and carbohydrate) in animal bodies;
- The measurement process does not necessitate the slaughtering of experimental animals, which is low-cost and has a short cycle.



1.Pressure-regulated bag 2. Oxygen valve 3. Temperature and humidity sensor 4. Ventilation valve 5. Differential pressure transmitter
6. Refrigeration unit 7. Heating device 8. Weight sensor of bird 9. Fecal pallets 10. Feeding devices
11. Integrated circuit board of oxygen cylinder 12. Diaphragm pump 13. Sealed box 14. data-acquisition system
15. Oxygen cylinder 16. Weight sensor Q1, Q2, Q3 are solenoid valves.

Our Innovations

- Through innovative sealing technology and climate control technology, the breathing chamber has achieved complete isolation of air from the outside world and a comfortable environment;
- Developed an iterative algorithm to stabilize the oxygen concentration within the cabin consistent with the initial value, reducing errors;
- The measurement process is independent, fully intelligent, and provides real-time data, reducing reliance on the skills of measurement personnel.

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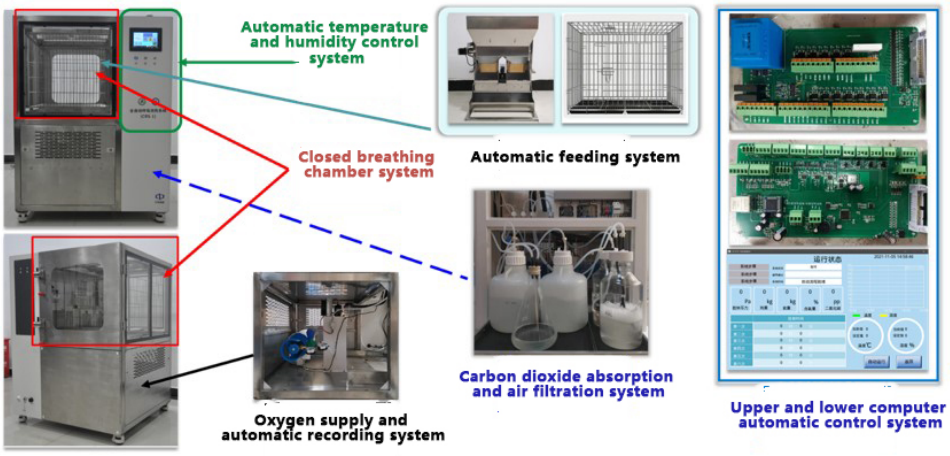
Automatic Respiration Calorimetry System

Main Components



Software Interface

Intellectual Properties (Invention Patent Publication Number: CN 114593843A)

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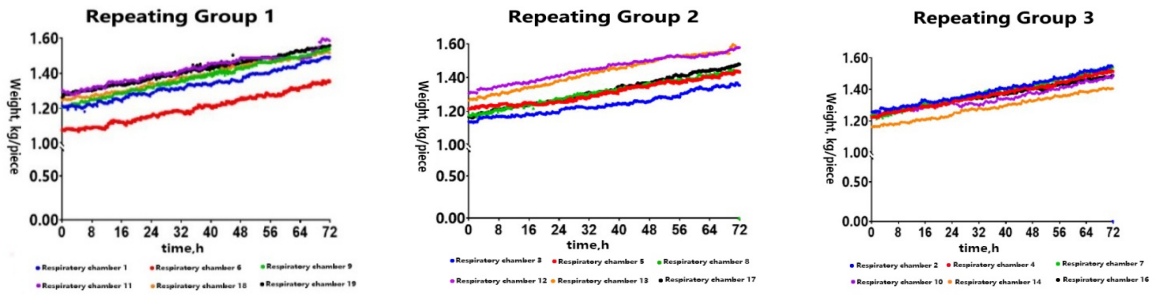
Reproducibility of Growth Curve and Growth Performance of Broilers

- **Reproducibility of growth curves in broilers**



- **Reproducibility of growth performance in broilers**

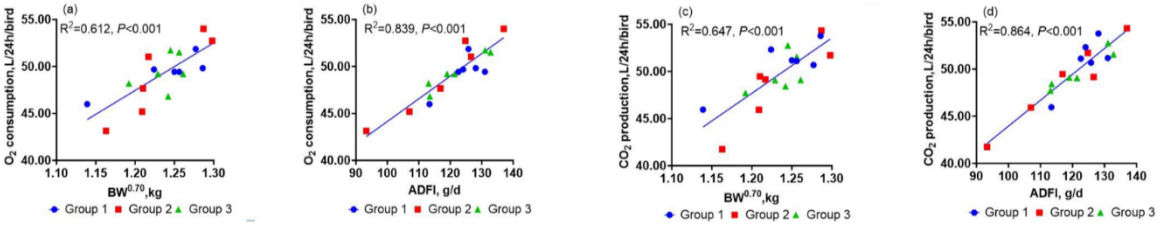
Repeat group			SEM	P value	Coefficient of variation,%		
1	2	3			Repetitive internal CV	Repetitive interval CV	Total CV
1219	1211	1227	25	0.905	5.03	0.53	4.62
1510	1485	1498	31	0.856	5.10	0.67	4.70
1239	1231	1238	18	0.949	3.66	0.28	3.35
97.6	91.8	91.1	4.5	0.551	11.75	3.09	11.16
124.2	117.6	121.8	4.4	0.580	8.93.	2.24	8.45
1.28	1.29	1.34	0.03	0.364	6.08	2.11	5.94

Reproducibility of O_2 Consumption and CO_2 Generation in Broilers

- **Linear regression of O_2 consumption, CO_2 generation, and average metabolic weight per unit, average daily feed intake in broilers**

Linear regression of oxygen consumption in broiler chickens with average unit metabolic weight and average daily feed intake

Linear regression of carbon dioxide production in broiler chickens with average unit metabolic weight and average daily feed intake



- O2 consumption (L/24h/piece)= 21.97×BW0.70(kg) + 0.182×ADFI(g) (R2=0.999, RMSE=1.0);
- CO2 generation (L/24h/ piece)=15.88×BW0.70(kg) + 0.250×ADFI(g) (R2=0.999, RMSE=1.0);
- FastingRQ:15.88/21.97=0.723
- Fasting produces heat: [21.97×3.866+15.88×1.20]×4.184=435KJ/ BW0.70/24h
- Fasting produces heat in broiler chickens: 450KJ/ BW0.70/24h(Noblet et al., 2015)

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- **Reproducibility of O_2 consumption, CO_2 generation, and respiratory entropy in broilers**

Repeat group			SEM	P value	Coefficient of variation,%		
1	2	3			Repetitive internal CV	Repetitive interval CV	Total CV
49.22	49.69	49.34	0.74	0.903	2.72	1.21	2.70
39.87	40.26	39.94	0.60	0.893	2.44	1.24	2.49
49.98	50.85	49.98	0.91	0.758	3.18	1.86	3.38
40.49	41.21	40.47	0.71	0.723	2.74	1.93	3.10
1.02	1.02	1.01	0.01	0.580	1.80	0.68	1.73

Reproducibility of Energy Distribution in Broilers

- **Reproducibility of energy distribution in kcal/kg**

Repeat group			SEM	P value	Coefficient of variation,%		
1	2	3			Repetitive internal CV	Repetitive interval CV	Total CV
3492	3480	3475	28	0.903	1.89	0.21	1.72
2023	2089	2066	26	0.236	3.01	1.31	3.03
950	990	970	17	0.270	4.06	1.67	4.04
2542	2490	2506	28	0.425	2.63	0.86	2.54
1469	1392	1409	37	0.332	6.18	2.31	6.07
696	672	684	12	0.377	4.11	1.43	3.99
772	720	726	34	0.510	11.04	3.19	10.51

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