

## 王波 副教授

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### 基本信息:

王波, 男, 生于1988年2月, 湖南沅江人。博士, 副教授, 硕士生导师。

### 简介:

本科、硕士毕业于中国农业大学动物科技学院, 师从袁建敏教授。2017年在华盛顿州立大学杜敏教授实验室获动物科学专业哲学博士学位。2017年-2018年在麦克马斯特大学医学院Dr. Greg Steinberg实验室从事博士后研究工作。2018年引进到中国农业大学动物科技学院工作。长期研究脂肪细胞分化机理、胎儿程序化、营养水平对脂肪及肌肉发育的影响。近年来, 系统阐明了维生素A在脂肪发育过程中的作用和机制, 为防治肥胖及其相关的代谢疾病提供了理论依据。发现维生素A在怀孕期和哺乳期对后代脂肪的沉积的程序化作用, 揭示了早期营养因素对抗肥胖能力的长远影响。同时, 通过研究维生素A对肉牛肌间脂肪和肌肉发育的影响, 为提高反刍动物生产性能和肉质提供了有效的营养调控手段, 有助畜牧业创造更高经济价值。揭示了血管调控脂肪细胞发育并提供脂肪前体细胞的机理, 为防治肥胖相关代谢疾病以及改善动物肉质提供了新的靶点。此外, 构建了诱导反刍动物细胞体外脂肪分化的方法, 为反刍动物脂肪发育研究提供了急需的实验手段。



相关研究获得了社会广泛关注, 多次在国际会议做口头报告, 有一些新闻报道和评论:

<https://www.healthcanal.com/metabolic-problems/obesity/237286-prenatal-vitamin-boosts-good-fat-prevent-obesity.html>

<https://news.wsu.edu/2017/04/27/vitamin-affects-good-fat-obesity/>

<https://www.biotechniques.com/news/Happy-Hour-Hit-or-Miss/biotechniques-366396.html>

在社交媒体如Facebook和Twitter上也引起了广泛关注。

我的科研工作刚刚起步, 急需有强烈科研热情的学生一起奋斗。我会传授你科研技能, 引导你形成自己的科研思路, 将来也可协助你出国深造。请联系18612967930 或wangbo123@cau.edu.cn, wangb80@mcmaster.ca, Wechat ID: hellowangbo。

### 学习与工作经历:

2006-2010, 中国农业大学, 动物科学, 学士

2010-2012, 中国农业大学, 动物营养与饲料科学, 硕士

2012-2017, Washington State University, Animal Science, Ph.D.

2017-2018, McMaster University, Postdoctoral fellow

2018至今, 中国农业大学, 动物科学技术学院, 副教授

### 研究方向:

- 胎儿程序化
- 肌肉发育与肉品质
- 脂肪发育与代谢，肥胖与糖尿病
- 血管发育与脂肪发育的关系

#### 主要研究成果：

1. 维甲酸抑制白色脂肪形成与维持的重要基因-Zfp423的去甲基化，从而抑制白色脂肪细胞的分化与油脂累积。
2. 维甲酸提高VEGFA的表达来促进脂肪组织中血管的形成，增加米色脂肪（beige adipocyte）前体细胞。维甲酸、VEGFA与P38 MAPK调控PRDM16的转录，促进米色脂肪的形成。同时也用体内、体外模型证明了血管为脂肪前体细胞库，通过VEGF来促进白色脂肪褐色化。
3. 冷刺激促进ALDH1A1表达，从而提高血液与脂肪中维甲酸含量，促进白色脂肪褐色化。
4. 母体维生素A水平影响胎儿脂肪前体细胞构成及分化，适当母体补充维生素A提高褐色脂肪比例，增强后代抗肥胖能力。
5. 酒精通过ALDH1A1来提高维甲酸水平，促进白色脂肪褐色化。在正常个体中适度摄入酒精抵抗肥胖，但过度饮酒会加速脂肪及肌肉消耗，缩短患癌个体的存活时间。
6. 在肉牛生长早期注射维生素A促进肌肉发育，增加氧化型肌纤维类型的比例。
7. 在肉牛生长早期注射维生素A增加脂肪前体细胞数量，在后期肥育过程中提高肌间脂肪比例。
8. 首次使用3D培养模式诱导反刍动物脂肪细胞分化，大大提高诱导效率，解决了反刍动物细胞体外诱导脂肪的难题。在此基础上发现了血管因子在反刍动物脂肪细胞分化过程中的重要作用。

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1. **Wang B**, Fu X, Liang XW, Wang ZX, Zhao L, Tian QY, Zhao JX, Gomez NA, Trombetta SC, Avila JM, Zhu MJ, and Du M. Retinoic acid induces white adipose tissue browning by increasing adipose vascularity and inducing beige adipogenesis of PDGFR $\alpha$ <sup>+</sup> adipose progenitors. **Cell discovery**, 2017, 3:17036.
2. **Wang B**, Wang ZX, Avila JM, Zhu MJ, Zhang FY, Gomez NA, Zhao L, Tian QY, Zhao JX, Maricelli J, Zhang H, Rodgers BD and Du M. Moderate alcohol intake induces thermogenic brown/beige adipocyte formation via elevating retinoic acid signaling. **FASEB J**, 2017 Vol.31.
3. **Wang B**, Fu X, Zhu MJ, Du M. Retinoic acid inhibits white adipogenesis by disrupting GADD45A mediated Zfp423 DNA demethylation. **Journal of molecular cell biology**, 2017, 9(4):338-349.
4. **Wang B**, Fu X, Liang XW, Wang ZX, Yang QY, Zou TD, Nie W, Zhao JX, Gao PF, Zhu MJ, Avila JM, Maricelli J, Rodgers BM, and Du M. Maternal Retinoids Increase PDGFR $\alpha$ <sup>+</sup> Progenitor Population and Beige Adipogenesis in Progeny by Stimulating Vascular Development. **EbioMedicine**, 2017, 18: 288-299.
5. **Wang B**, Zhang FY, Wang ZX, Zhang H, Du M. Alcohol aggravate cancer induced cachexia via inducing adipose browning and skeletal muscle atrophy. **Oncotarget**, 2017.
6. **Wang B**, Q. Yang, C. L. Harris, M. L. Nelson, J. R. Busboom, M. J. Zhu, and Du M. Nutrigenomic regulation of adipose tissue development – role of retinoic acid. **Meat Science**, 2016, 120: 100-106.
7. **Wang B**, Min Z, Yuan JM. Apparent ileal digestible tryptophan requirements of 22-to 42-day-old broiler chicks. **The Journal of Applied Poultry Research**, 2015: pfv061.
8. **Wang B**, Min Z, Yuan JM, Zhang BK, Guo YM. Effects of dietary tryptophan and stocking density on the performance, meat quality, and metabolic status of broilers. **Journal of Animal Science and Biotechnology** 2014, 5(1): 44.
9. **Wang B**, Yang G, Liang XW, Zhu MJ, and Du M. Grape seed extract prevents skeletal muscle wasting in interleukin 10 knockout mice. **BMC-Complementary and Alternative Medicine**, 2014, (14): 162.
10. Ma YN\*, **Wang B\***, Wang ZX, Zhu MJ, Du M. Adipogenic differentiation of bovine stromal vascular cells in organoid culture. **Animal**, 2018. (\*equal contributions)
11. C. L. Harris\*, **Wang B\***, J. M. Deavila, J. R. Busboom, M. Maquivar, S. M. Parish, B. McCann, M. L. Nelson, M. Du, Vitamin A administration at birth promotes calf growth and marbling fat development in Angus beef cattle. **Journal of animal science and biotechnology**, 2018. (\*equal contributions)
12. Zhao L, Zou TD, Gomez N, **Wang B**, Zhu MJ, and Min D. Raspberry alleviates obesity-induced inflammation and insulin resistance in skeletal muscle through activation of AMP-activated protein kinase (AMPK)  $\alpha$ 1. **Nutrition & Diabetes**, 2018.

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14. Fu X, Yang QY, **Wang B**, Zhao JX, Zhu MJ, Parish SM, Du M. Reduced satellite cell density and myogenesis in Wagyu compared with Angus cattle as a possible explanation of its high marbling. **Animal**, 2017.
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26. 梁恒之, 王波, 尹达菲, 侯卓成, 袁建敏. 不同饲料转化率的北京鸭和枫叶鸭消化器官发育及盲肠微生物菌群的比较研究. 中国畜牧杂志, 2013, 49(19) :42-46.
27. 王波, 何龙, 黄春喜, 袁建敏. 螺旋蛋发生特点及产螺旋蛋母鸭生理指标比较研究, 水禽世界, 2011, 增刊: 214-219.
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33. 王波, 袁建敏, 阎磊, 陈瑶. 螺旋蛋对孵化性能的影响, 中国家禽, 2009, 31 (8) : 46-47.

#### 发表摘要:

1. **Wang, B.**, X. Fu, S. M. Zhang, X. W. Liang, M. J. Zhu, and M. Du. Maternal Vitamin A Supplementation Expands Adipose Progenitor Population through Promoting Vascular Development. Experimental Biology Meeting, San Diego, California, April 1-5, 2016.
2. **Wang, B.**, M. J. Zhu, and M. Du. All-trans-Retinoic Acid Inhibits Adipogenesis by Interrupting Gadd45 $\alpha$  Induced Zfp423 Demethylation. Experimental Biology Meeting, San Diego, California, April 1-5, 2016.
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5. Yuan J, D Liu, **Wang B**, Z Huang, Y Fan, C Huang. Comparative of egg quality, minerals content, albumen characteristics and weight loss between luowen egg and normal egg of duck. *World's Poultry Science Journal, Egg Meat Symposia 2011*, b-044, (67):40-41.
6. Yuan J, C Huang, **Wang B**, S Zhou. Effects of Cage Versus Floor Litter Environments on Blood Parameters and Meat Quality in Broilers. *Poult Sci*. 2011, Vol 89, E-Suppl.1.
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口头报告:

1. Maternal Vitamin A Supplementation Expands Adipose Progenitor Population through Promoting Vascular Development. Experimental Biology Meeting, San Diego, California, April, 2016.
2. All-trans-Retinoic Acid Inhibits Adipogenesis by Interrupting Gadd45 $\alpha$  Induced Zfp423 Demethylation. Experimental Biology Meeting, San Diego, California, April, 2016.

奖励与荣誉:

Michael G. DeGroot Fellowship Awards, McMaster University, 2017-2018

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GPSA Travel Grant, Washington State University, 2016

CRB travel award, Washington State University, 2015-2016

Edward & Sally A. Veenhuizen S Scholarship, Washington State University, 2014 – 2015

Frasier Fred W. Memorial Scholarship, Washington State University, 2013 - 2014

优秀毕业论文, 中国农业大学, 2012

国家建设高水平大学研究生留学奖学金, 留学基金委, 2012 - 2016

2006~2007年度学习三等奖学金、新希望奖学金, 2007~2008年度学习三等奖学金, 2008~2009年度学习二等奖学金、汪-王奖学金, 2008~2009年度三好学生, 2010本科优秀毕业论文, 2010本科优秀毕业生, 2010~2011年度研究生三好学生, 2010~2011年度雅来奖学金

专利:

鸭用饮水器, 专利号: ZL200920278337.3, 发明人: 袁建敏; 王波; 殷成刚

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