Cooking meat

Let's use some physics

We try to understand the physics of extreme situations...









... but we don't use this to understand what is going on in food





Overview

What is meat?

Why cook it?

Examples

Expand your 'parameter space'



Tough meat contains more collagen than lean meat





Heat increases molecule vibrations and degenerations



The outside browns as sugars are converted above 140 °C

Browning rate



120 130 140 Temperature [°C]

Finally, some physics







This online heat equation solver shows your meat throughout the process of cooking

| Cook My Meat Instructions About | Celsius Fahrenheit |
|--|---------------------------|
| Recipe: 4 minutes a side as table as text 4 minutes a side | Protein State Temperature |
| Meat type: Steak Thickness: 3 cm Starting at: 23 °C | |
| Side 1Side 2min:sec1. $150 \degree C \leftrightarrow 23 \degree C 4:00$ ×2. $23 \degree C \leftrightarrow 150 \degree C 4:00$ ×3. $23 \degree C \leftrightarrow 23 \degree C 5:00$ ×+Total:13:00 | |
| b Cook b | |



What happens in a steak: 4 minutes a side (+ 5 min. rest)



It allows you to compare cooking techniques



150°C

5:50

And it allows you to compare cooking techniques



And it allows you to compare cooking techniques

3.0 Side 2.5 Meat Thickness (cm) 2.0 Sear, then 1.5 1.0 cook low 0.5 Side 0.0 230°C 1:40 0:00 3:20 5:00 6:40 8:20 10:00 11:40 13:20 15:00 16:40 Time (minutes:seconds) 3.0 Side 2 2.5 Meat Thickness (cm) Sous vide, 2.0 1.5 LN + deep fry 1.0 0.5 Side 0.0 63-C 0:00 8:20 16:40 25:00 33:20 41:40 50:00 58:20

Time (minutes:seconds)

| | 4 minutes a side | 2 minutes a side | flip every 15 seconds | Sear, then cook low | Sous vide, LN + fry |
|-----------|---------------------|------------------|--------------------------|---------------------|------------------------|
| Raw | 0% | 0% | 0% | 0% | 0% |
| Rare | 0% | 37% | 30% | 53% | 67% |
| Med-rare | 0% | 13% | 10% | 7% | 7% |
| Medium | 27% | 17% | 13% | 13% | 0% |
| Well done | 60% | 27% | 40% | 23% | 13% |
| Browning | 13% | 7% | 7% | 3% | 13% |
| Charring | 0% | 0% | 0% | 0% | 0% |

Resources and other stuff



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OF THE KITCHEN

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- Brining
- Ageing
- Marinating
- Pressure cooking
- Slow cooking

There are enough tools available for cooking

- Rest your meat
- Tender meat requires even heating throughout
- Temperature 'control' is important for the result